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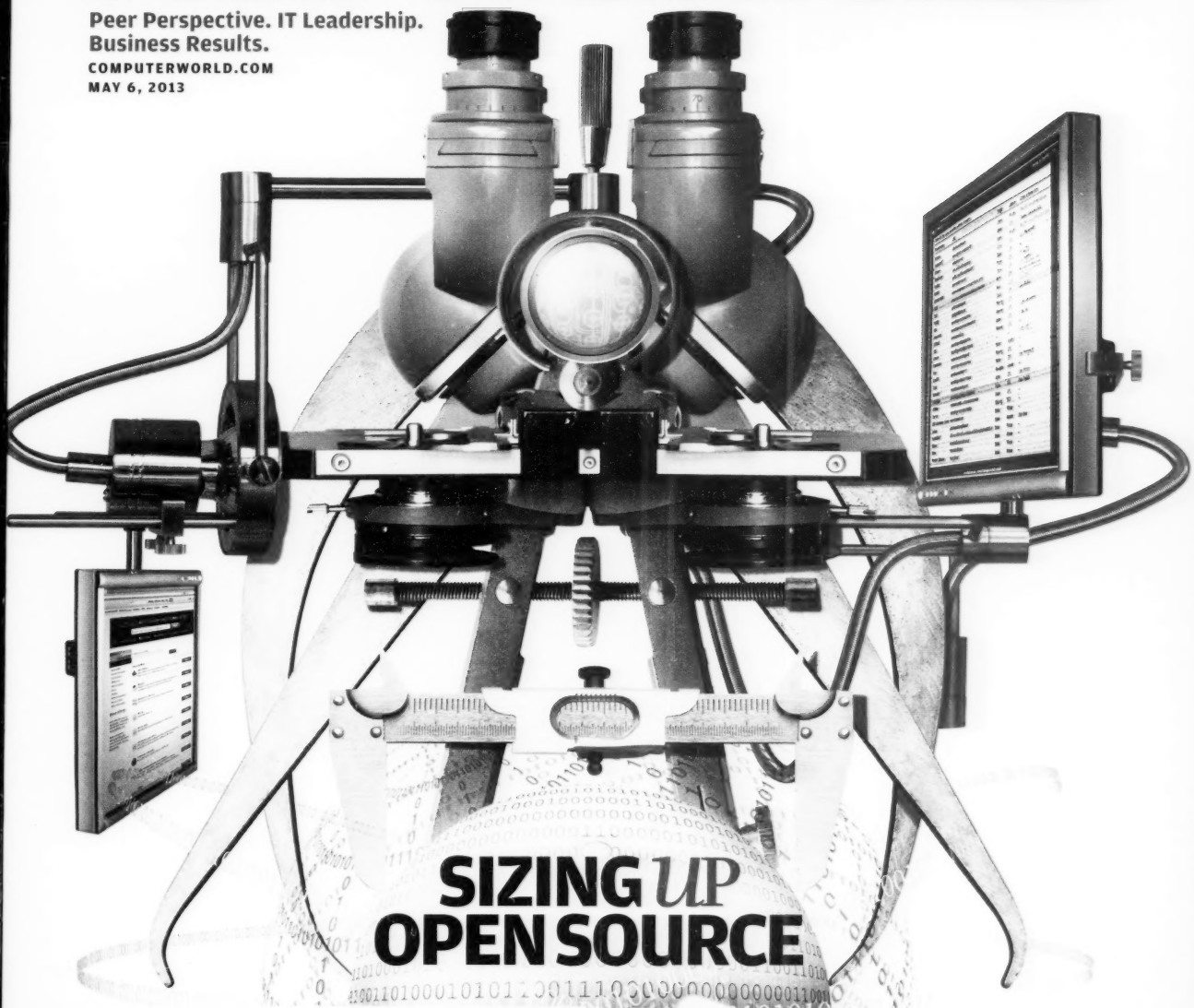

SIZING UP OPEN SOURCE

Open-source software throws a wrench into traditional evaluation processes. Here's what to look for.

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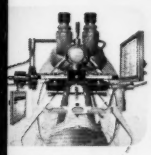

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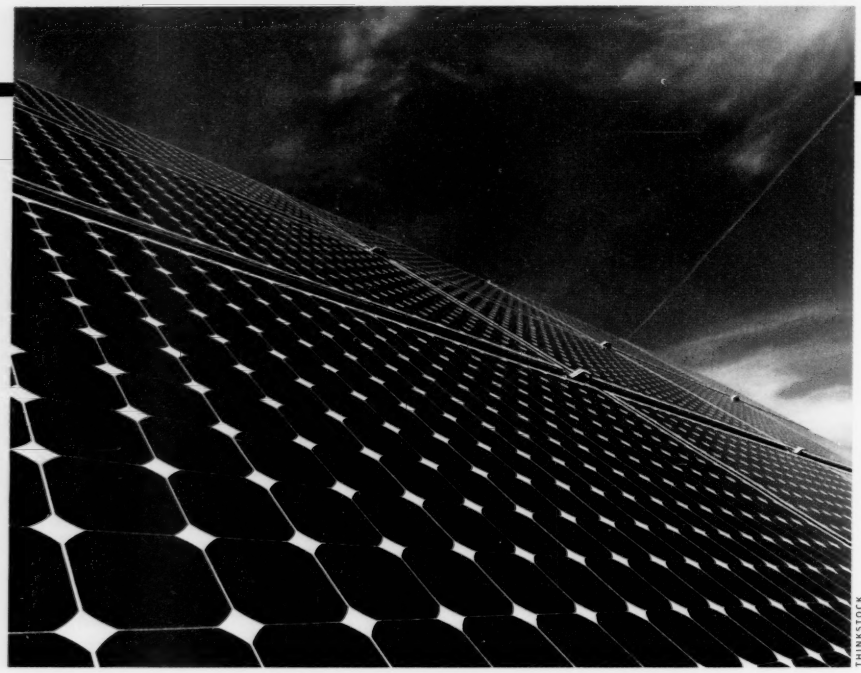

THINKSTOCK

SOLAR POWER

Harvard Pushes for Cheaper Solar Panels

IN A MOVE that it hopes will help usher in an age of low-cost solar power, Harvard University's Clean Energy Project (CEP) in June plans to release a list of 20,000 organic compounds that could be used to make cheap, printable photovoltaic cells (PVC).

The list, which the CEP will make available to solar power developers, could lead to the development of very low-cost PVCs. Using the compounds, a PVC that covers 1 square meter would cost about the same as the paint needed to cover the same area, according to Harvard.

The CEP's data "will ultimately benefit mankind with cleaner energy solutions," said Alan Aspuru-Guzik, a Harvard associate professor of chemistry and chemical biology.

Today, the most popular PVCs are made of silicon and cost about $5 per wafer to produce. For a solar energy technology to be competitive, each wafer would need to cost about 50 cents, according to Aspuru-Guzik.

The compounds on the CEP's list could also improve the solar conversion rates of PVCs. Currently, the top solar conversion rate of silicon PVCs is about 12%, meaning that only 12% of the light that hits them is converted to energy.

The CEP uses IBM's World Community Grid — which relies on the spare processing power of around 6,000 computers all over the world — in its search for the best molecules for organic photovoltaics, as well as the best ways to assemble the molecules to build inexpensive solar cells.

Harvard has built data storage systems with a capacity of about 400TB to capture the results of the computations.

– Lucas Mearian

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IT INDUSTRY

Google CEO Backs Non-core Products Plan

Google's core offering may be search, but the company is just as serious about providing in-the-moment information to users with emerging technologies such as Google Now, self-driving cars and Google Glass, CEO Larry Page said during the company's recent earnings call with analysts.

Those products, along with voice-based search and others, may be risky "big bets," but Google doesn't want to be focused only on "incremental technologies," Page said.

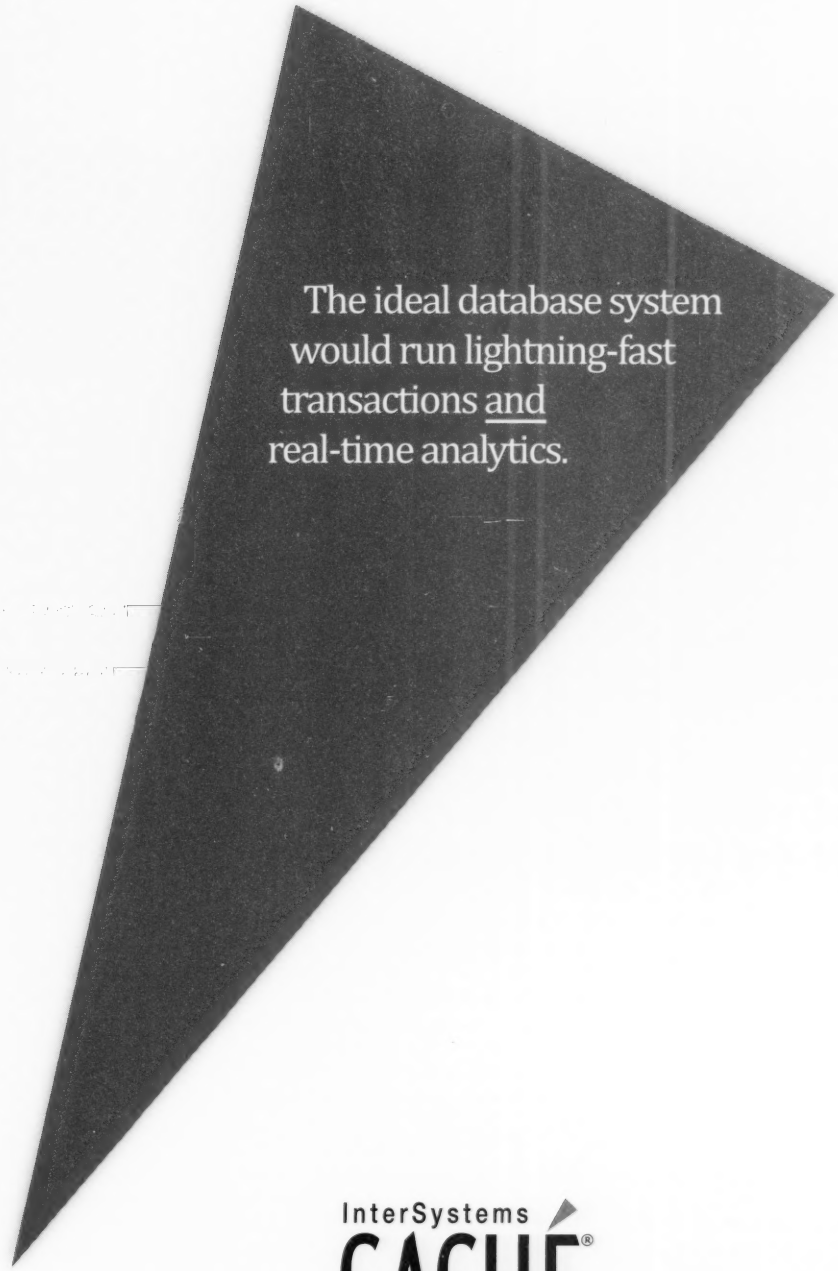
"That is why we're investing in what appear to be speculative projects," he added. "[Most companies] never do anything different, and they run into problems for that reason."

During the conference call, financial analysts asked how Google will monetize new products such as Google Now, which functions as a kind of personal digital assistant to automatically give users information as they go about their day.

"I'm not worried about that," Page said. "The better the job we can do in providing users with information without their asking for it, the better we can provide commercial information from people who are excited about promoting it."

For the latest quarter, Google's sales rose by 31% to about $14 billion, driven partly by strong gains in advertising revenue.

– ZACH MINERS, IDG NEWS SERVICE



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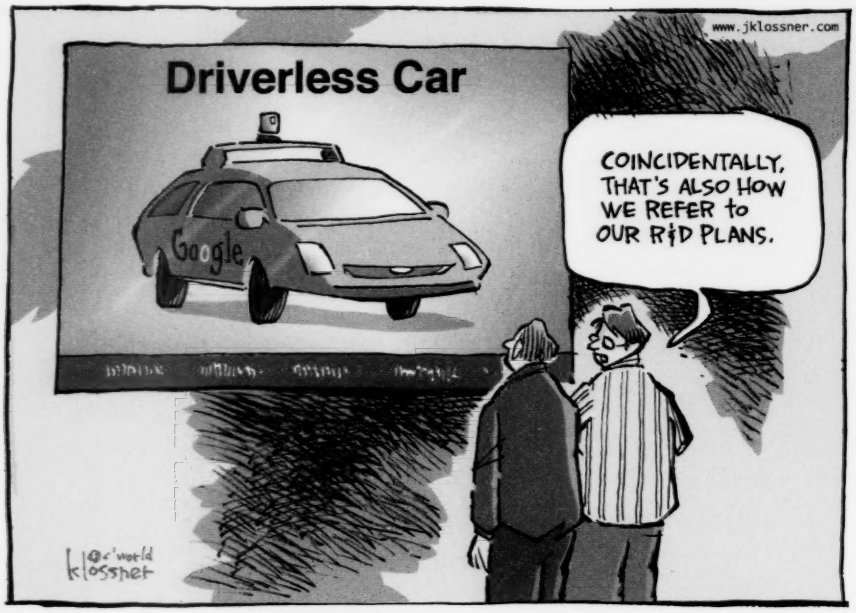
BETWEEN THE LINES
By John Klossner



IMMIGRATION BILL

Tech Execs Say H-1B Checks May Help

AGAINST A BACKDROP of cornfields and farmhouses, this message appears on the home page of IT support services provider Caleris: "Outsource to Iowa. Not India."

The point couldn't be clearer. The company is competing from rural Iowa against offshore IT services providers in India and other locales.

Caleris co-founders Sheldon Ohringer and Rick Grewell, both native Iowans, believe the U.S. Senate's long-awaited comprehensive immigration bill could benefit their business.

The bill, written by the so-called Gang of Eight Democratic and Republican senators, seeks restrictions on the use of workers holding H-1B and L-1 visas and would likely increase costs for offshore IT service providers.

Ohringer said he isn't well versed in the specifics of the legislation, but he understands its intent. "If the costs go up to do it in India or offshore, that is a positive for us," he said.

The bill could create challenges for offshore outsourcers by eventually limiting H-1B and L-1 workers to 50% of an employer's workforce and by saddling companies with fees of as much as $10,000 for every visa holder they employ beyond that limit. Foreigners holding temporary visas make up for more than half of the U.S.-based workforces of many IT service providers that are headquartered overseas.

The bill also requires employers to pay higher wages to foreign workers with H-1B visas. How much higher isn't clear.

Ohringer said he hasn't lobbied elected officials to crack down on offshore outsourcers on behalf of Caleris, which was founded nine years ago with 25 workers and now employs 400 people in four facilities.

Brian Keane, CEO of IT services company Ameritas Technologies, agreed that the Senate bill would benefit domestic IT services providers. The bill would help the United States maintain its technological self-sufficiency, said Keane, former CEO of a $1 billion IT services company that bore his name.

– *Patrick Thibodeau*

Micro Burst

Daily deals site LivingSocial urged

50 million

users to reset their passwords after hackers hit the company's servers.

EMERGING TECH

Florida Restricts Use of Drones By Police

In response to public concern that technological advances could threaten the privacy of citizens, Florida has passed a law restricting the use of unmanned aerial vehicles, or drones, by state law enforcement officials. It's the first law of its kind in the country.

The Freedom From Unwarranted Surveillance Act requires local police to obtain a warrant based on probable cause before using a drone for surveillance purposes.

Police are only allowed to use drones without a warrant in situations where there's an imminent threat to property or life, or if the U.S. Department of Homeland Security has declared a high risk of a terrorist attack.

Florida Gov. Rick Scott signed the bill into law on April 25. In a statement following the Florida Senate's passage of the bill, Scott said, "This law will ensure that the rights of Florida families are protected from the unwarranted use of drones."

Several other states, including Texas, Montana, Missouri, Virginia, Nebraska and Oregon, are considering similar measures.

In February 2012, President Barack Obama signed a law permitting FAA supervision of unmanned aerial vehicles.

– JAIKUMAR VIJAYAN

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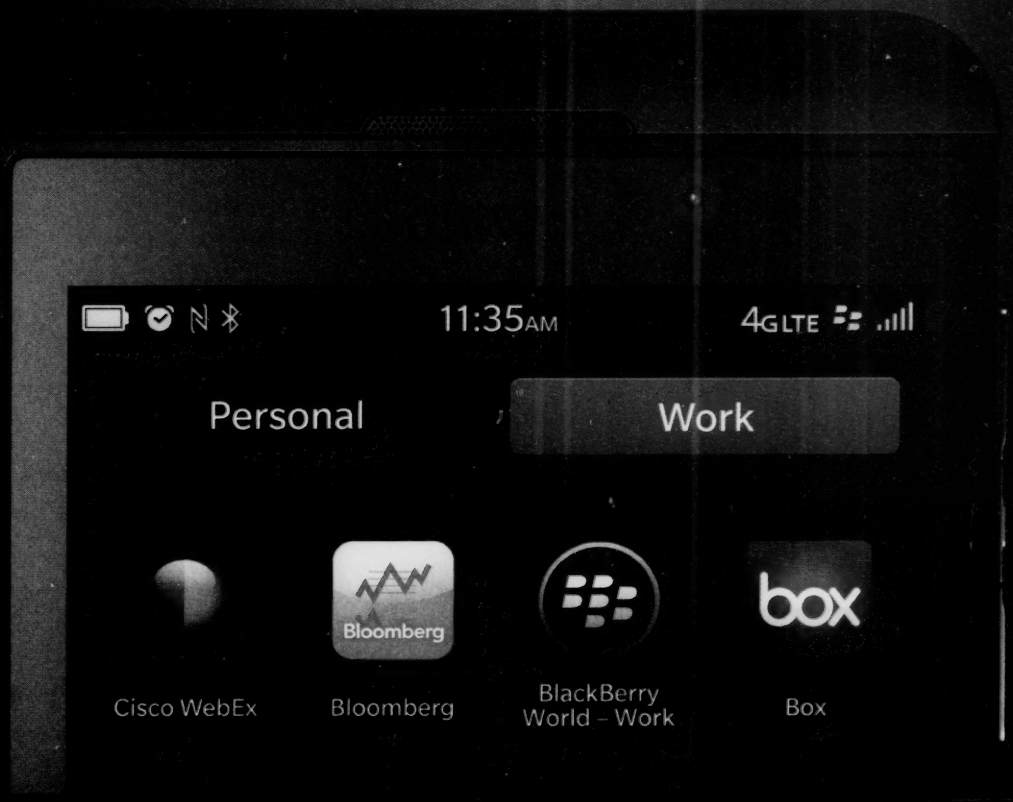

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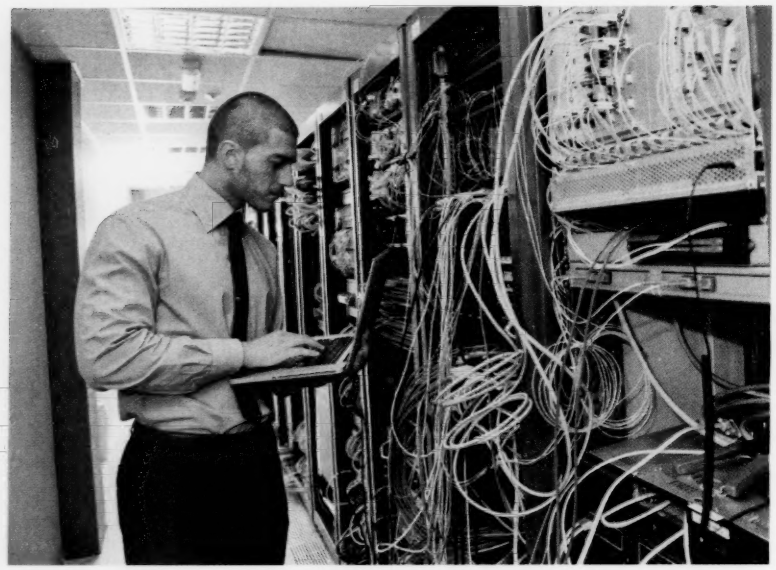

Business-Savvy IT Pros Key in Down Economy

IT workers increasingly need to have business acumen along with technical skills so they can better help struggling companies boost the bottom line. By Fred O'Connor

ECONOMIC WOES in recent years have spurred companies of all sizes to shake up data center hiring, training, development and other processes to better align IT and business operations — and boost the bottom line.

Many companies now look for IT employees who can contribute more than code, and they think business acumen is as important as technical expertise, because business-savvy IT workers can help companies cut costs and in some cases even generate revenue, according to IT executives.

For example, BoxTone, a startup provider of mobile device management software and services, asks prospective IT employees during the interview process whether they're interested in learning about the business, said CEO Alan Snyder, adding that those who say they aren't interested don't get hired.

"You must understand the business to drive it forward," Snyder said. "I want somebody that acts and functions as an owner and has a stake in the business and our customers."

Snyder noted that the best new product ideas at a company like BoxTone often come from internal IT workers.

Amsterdam-based electronics giant Philips is in the midst of an effort to better align IT and business as part of a larger plan to streamline the steps needed to bring products and services to market.

The companywide effort requires IT workers who can offer insight into tools beyond traditional enterprise software, said deputy CIO Joe Norton.

"We're all buying from Oracle, from SAP, from Microsoft," he said. "What's the competitive advantage? There is none. The competitive advantage is all about information acquisition."

Obtaining and using that information to develop the right products when markets need them is the future of Philips and its IT unit, Norton said.

"They're going to be business technologists who review how we go to the marketplace," Norton said.

Philips, which has IT operations in more than 600 locations in 60 countries, has taken steps to help its IT staff adjust.

For instance, Norton said, the company has started using webcasts, workshops, newsletters and panel discussions to explain its corporate focus and how departments are interconnected. In addition, Philips is now training all workers in how the Agile software development process, which includes user input from start to finish, will be used at the company.

Chesterfield, Mo.-based healthcare provider Mercy, whose 32 hospitals treat more than 3 million patients annually, completed a search for a business-savvy CIO when it hired Gil Hoffman in October.

Hoffman's responsibilities will include helping to develop IT services to sell to other healthcare companies. "When they recruited me, there was a real interest in trying to get more business knowledge, instead of just technology knowledge, into the IT organization," he said.

Mercy's IT shop is still an internal service organization, but now it's more proactive and looks for ways to use technology to remove work obstacles. "We're much less focused on the technology and more focused on what kinds of problems we are trying to solve," said Hoffman.

> We're much less focused on the technology and more focused on what kinds of **problems we are trying to solve."**
>
> PHIL MERCY

Now that tech staffers are aware of what other departments expect from technology, Hoffman said, IT can play a constructive role in the technology purchase process and possibly help them save money. ◆

O'Connor *is a reporter for the IDG News Service*

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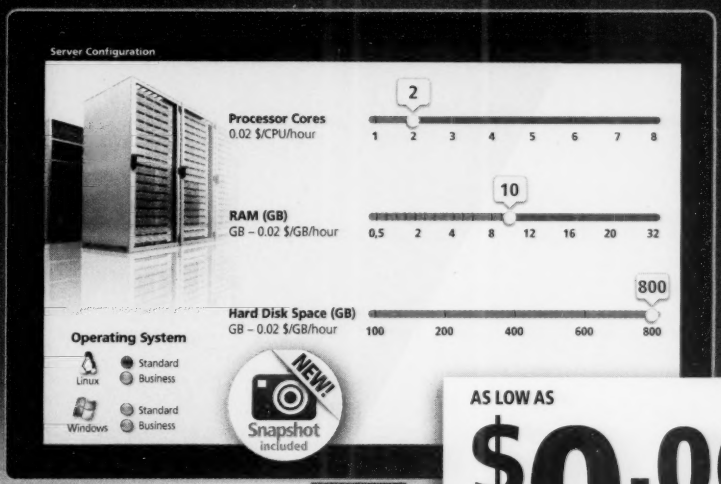

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Security Tools Can't Keep Hackers at Bay

Analysts say hidden breaches like one that exposed credit card data of Schnucks supermarket customers for four months could become commonplace. By Jaikumar Vijayan

FOR A FEW MONTHS earlier this year, the personal data of customers of the Schnucks supermarket chain was exposed to hackers whose work went undetected until after a card processing company issued an alert about fraudulent activity on a handful of credit and debit cards used at the stores.

Even after the alert was issued, it took a while to determine the cause and close the breach. In an initial probe, Schnucks quickly ruled out insider theft or faulty point-of-sale machines as causes. The St. Louis-based retailer then hired Mandiant, a cybersecurity firm, to pursue the investigation, but even Mandiant's specialists needed about two weeks to find and plug the breach, and then secure the company's systems.

Analysts say such delays in finding and closing breaches could grow more common because hackers are getting more sophisticated and the security tools needed to keep them at bay are mostly still in development.

The difficulties encountered by the Schnucks security team and the security experts from Mandiant show how good online attackers are getting at concealing their tracks, said Avivah Litan, an analyst at Gartner. "You'd think they would have figured out what to shut off or at least how to control traffic" to stop data leaks, she added.

Increasingly, attackers are resorting to techniques like hiding stolen data inside legitimate files and encrypting data to evade detection, she said. "They cloak their malware or hide it within seemingly innocuous files so that it's very difficult to detect," she said.

"[Today's] network and enterprise security tools are not smart enough to detect the hacking when it occurs," and they might not even uncover such activity in a matter of hours or even days, Litan said.

"What's needed — and what some tech startups are working on — is behavioral modeling, baselining and profiling of all nodes and communication ports in an internal network," she said, adding that such tools would be able to detect abnormal activity and communications that occur for as little as a few seconds a week.

But developing such tools is a challenge. "This is difficult to pull off without a lot of false positives and noise in the system," Litan said.

Jim Huguelet, principal of the Huguelet Group, said the fact that it took so long to isolate the cause of the Schnucks breach "could indicate that the malware was custom-written for Schnucks' environment or utilized unique techniques to hide its existence."

"The number of cards compromised is significant given the relatively small size of the Schnucks chain and just proves that retailers of all sizes must be diligent in their protection of their payment processing systems," said Huguelet, whose firm advises companies on how to comply with credit card security standards.

The Schnucks probe eventually determined that about 2.4 million credit and debit cards used by customers at 100 stores and 96 in-store pharmacies in five Midwestern states were exposed to hackers between December 2012 and March 30.

The company launched an internal investigation on March 14, hired Mandiant five days later and publicly disclosed the breach on March 30.

Officials of the supermarket chain didn't respond to requests to comment further on the breach or the investigation into it. ◆

> [Today's] network and enterprise security tools **are not smart enough to detect the hacking** when it occurs."
>
> ANALYST, GARTNER

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James Turnbull

This CIO sees new opportunities for patient care with mobile solutions.

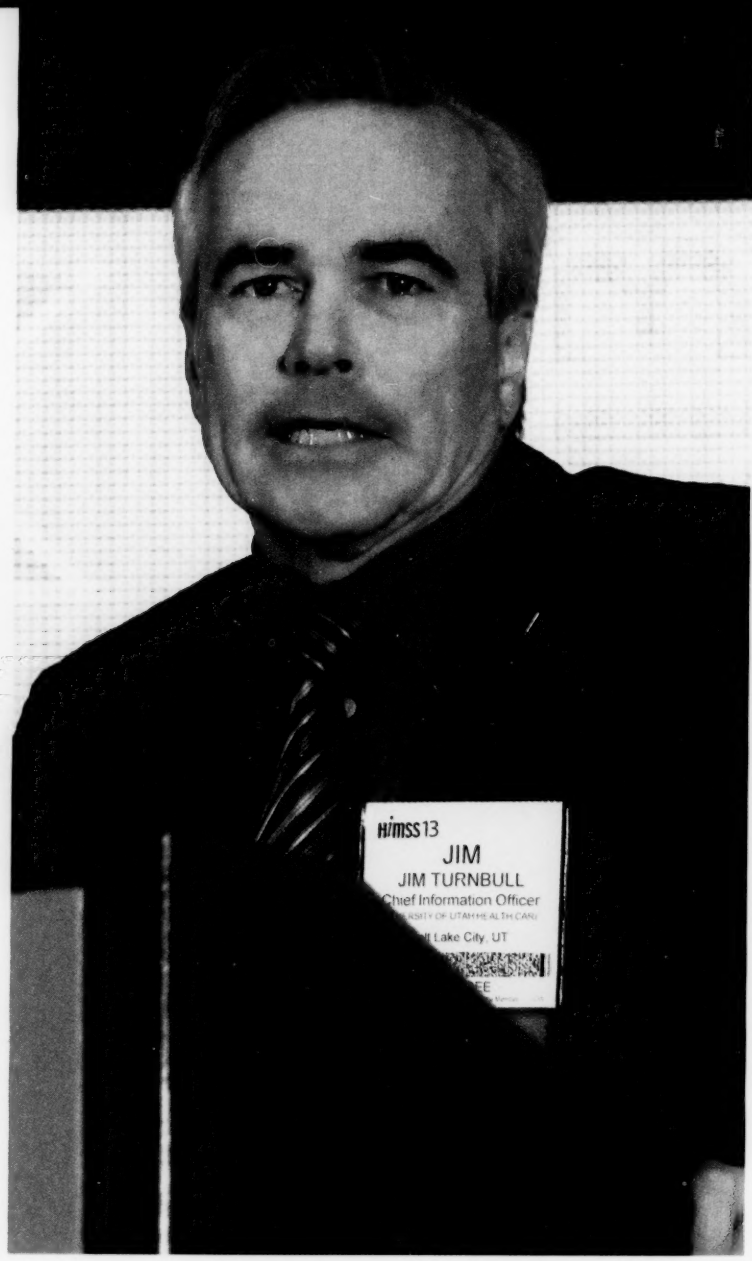
Family: "I'm recently engaged, and each of us has one son and one daughter."

What's your favorite tech toy? A Taylor acoustic guitar

Are you ever completely unplugged? "Yes, very deliberately. When I'm running, skiing, golfing and motorcycling."

Next career step: Retirement

Is there something interesting that people don't know about you? "My last job before healthcare I was working 2,200 feet underground in a nickel mine in northern Canada. The healthcare field looked better from down there."



AS A HEALTHCARE CIO, *Jim Turnbull promotes the use of technology as a tool to improve care and reduce patient costs. He has guided IT initiatives, including the deployment of electronic medical records and computerized physician order-entry systems, at several healthcare organizations. Now CIO at University of Utah Health Care in Salt Lake City, Turnbull was recently named the 2012 John E. Gall Jr. CIO of the Year by the College of Healthcare Information Management Executives and the Healthcare Information and Management Systems Society. Here he shares his thoughts on how IT is changing healthcare and how he's guiding IT transformation at UUHC.*

What has been your biggest success as CIO at UUHC? It's working with the team that was here when I arrived and having them deliver excellent results. We focused on some core disciplines, getting a good security plan in place, implementing the discipline of ITIL and project management, and really ramping up our game on that side.

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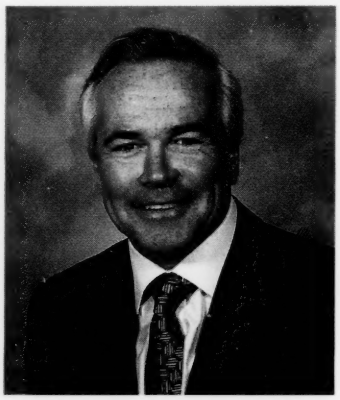
We focused on what we call strategic management — or strategically aligned management — and there's a big focus on recruitment and retention, customer advocacy and focusing on tracking, measuring and communicating our results.

Is it difficult to inherit a team? In my experience — and I've worked at four healthcare organizations — the typical thing I find when I walk in is there tends to be a high level of dissatisfaction with IT from other parts of the organization. That's something I felt when I walked in here. I found that, rather than replacing the team, there's a lot of talent here and it was a matter of getting them aligned and getting them back to the basics.

What was the biggest technology challenge you've faced at UUHC? We have a main campus and a health sciences campus. There's the more traditional university and adjacent to it is the health sciences campus, which includes the hospital and some of our research clinics as well as the schools of medicine, nursing, pharmacy and allied health. The infrastructure teams were split between the two. And when I got here, we realized we had an opportunity to bring those two teams together, but the next challenge was to bring the data centers together. That meant moving seven separate data centers on campus to a single data center. As you can imagine, that's a pretty complex process. From beginning to end it was about a three-year process, and it was completed without any serious hiccups.



> **The action is shifting quickly to mobile health solutions** with much greater involvement of the patients in their healthcare.

What about the biggest nontechnical challenge? It was getting buy-in for the development and communication of a strategic plan for IT, staying focused on that plan and reaching a stage where the organization had a great deal of confidence in our IT organization based on our delivery of results. There was a fair degree of skepticism that the IT team could work together with the rest of the organization and deliver on the plan. But now there's very little disagreement within the organization that we did that.

How do you recruit and retain top talent? Our leadership team in IT felt that the people best able to answer that is our team. So we organized a committee without any senior leadership on it. About 15 of them got together and came up with 85 recommendations on how we could address the issue. They wanted to do a community day of service event, do things socially together, have broader recognition opportunities. They gave us the top 10 [to implement as a start]. It's the reason that one recent quarter we had zero turnover, and for four quarters our turnover is under 6%. Our annual turnover in the broader organization is about 15%. You can feel the change in morale. We stayed with the first 10 they brought us, and now we're biting off the next 10.

What's the top IT initiative you now have on your plate? We're trying to move to a single-vendor solution. We laid the groundwork for that, but we're about 14 months away from doing a major conversion for our in-patient applications. We'll turn off all our legacy applications and turn over to that. Our budget is about $46 million to do that.

Now that many healthcare organizations are firmly working with technology, what are the next big opportunities to use IT to improve healthcare? The action is shifting quickly to mobile health solutions with much greater involvement of the patients in their healthcare. It's just an incredibly exciting opportunity, and all types of applications are being developed that are smartphone- or tablet-based. I think most of us have the environments in place technologically to support it, but it's a very different focus. It's really individualizing the care. It's having them hooked into us.

What are the biggest challenges to taking advantage of those opportunities? Part of it is getting that initial traction and having some great use cases to demonstrate the benefits. It's been fun to see the doctors so engaged and having our team work so collaboratively.

Are patients more willing to use technology to help manage their own health? There are so many apps out there for healthcare right now it's just unbelievable. There's not a day that goes by that I don't bump into someone using a smartphone app for health or fitness.

— *Interview by* Computerworld *contributing writer*
Mary K. Pratt *(marykpratt@verizon.net)*

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OPINION

THORNTON A. MAY

Stalking the Elusive Data Scientist

It is virtually impossible to find all the necessary analytical skills in one human being.

Thornton A. May is author of *The New Know: Innovation Powered by Analytics* and executive director of the IT Leadership Academy at Florida State College in Jacksonville. You can contact him at thorntonamay@aol.com or follow him on Twitter (@deanitla).

THE NEWEST fantastic animal to inhabit the human imagination — joining a long list that includes the dragon, Gorgon, Loch Ness monster, sphinx, unicorn and yeti — is the data scientist. This mythical beastie has come to dominate the dreams of many of the otherwise sane people who run organizations. They see themselves locked in an epic struggle, coming up against a horde of data but armed with inadequate skills. As this pitched battle rages, the cry is heard: "Data scientists will save us!"

Feeding this vision are troubadours with PowerPoint presentations. They show up on the big data rubber-chicken circuit — that surfeit of conferences ginned up to take advantage of the rapidly growing interest in high-end analytics — to sing a narrative with three verses: There is ever more data, goes the first. There is potentially huge value in that expanding data set, runs the second. There is a rich and rapidly expanding tool set to assist in extracting value from that data, concludes the third. These are sung in a round over and over and over, but the air finishes on a very different note, with the sage on the stage saying something to this effect:

"And oh, by the way, you need really bright analytic geniuses/rocket scientists/quants/data scientists, who are very rare and very expensive. Despite this, you should buy our tools and get started anyway."

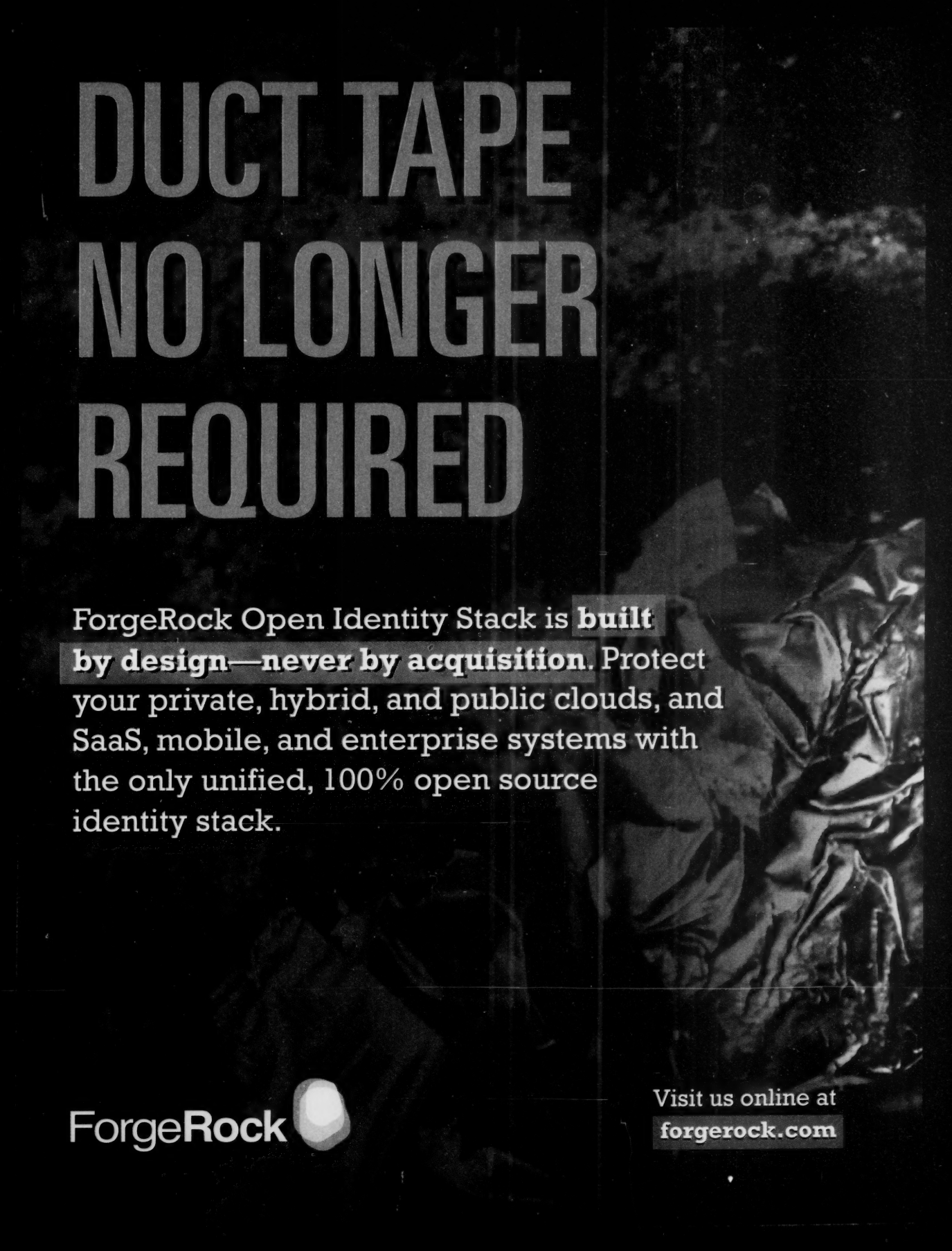
Naturally, outcomes-focused executives in the audience find that conclusion monumentally unsatisfying. But if data scientists are very rare, they decide, they will find them — and recruit them at any price. (See "Spring Training for BI Experts," page 28.)

At the IT Leadership Academy, we wanted to find out where this obsession with the mythical data scientist was heading. We interviewed over 100 executives charged with leading the charge to analytic competence in their organizations. It was generally agreed that data science and analytics is a multidisciplinary field, and it was widely conceded that it is virtually impossible to find all the necessary analytical skills resident in one human being. The non-hysterical in the bunch have rationally concluded that rather than stalk a mythological life form — a data scientist with all the skills required — they should adopt an "ensemble" approach to the deficit in analytical skills.

Here's how Scott Friesen, director for marketing analytics and customer insights at Ulta Beauty, explains this idea: "You have to create a portfolio of talent within a team. For example, you might have someone who is a great statistician but doesn't know database query mechanisms. So someone else on the team does the SQL pulls for the statistician, who hands off to the best communicator. That is who communicates the message to the business."

Glenn Wegryn, director emeritus of operations research at Procter & Gamble, skinned the analytical talent deficit in a very innovative way. As part of a multipronged talent strategy, he scoured the enterprise for employees who had analytical training but weren't employed in analytical jobs. This was a rich source of affordable raw quantitative skill. And that should not be surprising. Just about every student participating in the 6th Annual EEIC Engineering Capstone Design Showcase at Ohio State University demonstrated the raw skills necessary to create value with data.

So forget about the data scientist bogeyman. If you are eager to create value with data, go out and repurpose an engineer. They will love you for it. ◆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SIZING UP OPEN SOURCE

Open-source software throws a wrench into traditional software evaluation criteria. Here's what to look for and what you'll be expected to contribute.

BY STACY COLLETT

WHEN WEST TEXAS A&M UNIVERSITY wanted to develop a single sign-on portal for its 8,000 students that would unify its Web applications, student resources and social networking services, a steering committee came up with a list of six criteria for evaluating available software. They would compare software systems' features, mobility, single sign-on capabilities, look and feel, and flexibility, as well as their ability to integrate with existing Web applications.

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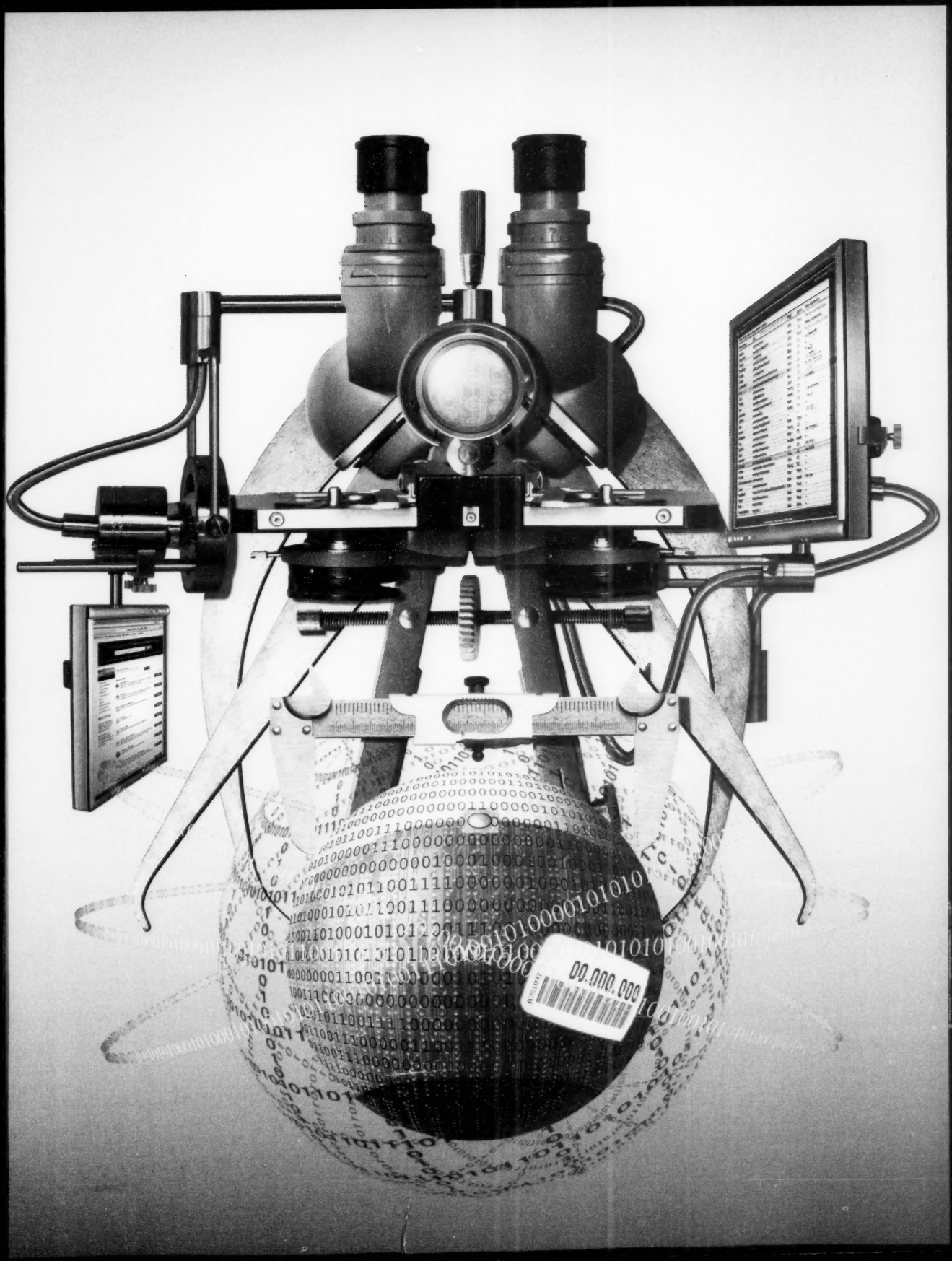
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But this wasn't an apples-to-apples comparison. CIO James Webb threw in a pair of open-source projects to be considered alongside commercial software packages. While it was easy to compare the systems on many of the criteria (the open-source pair won in all six categories), the committee had to add another question: How strong is the open-source user community, and could it help the university achieve its goals? The answer was yes, and the Canyon, Texas-based school chose the two open-source tools: uPortal, an architecture based on Java and XML, which also included support for mobile devices, and Jasig's Central Authentication Service (CAS) for its single sign-on service.

"One of the main reasons we went with the uPortal open-source solution is that Yale, Rutgers and the University of Wisconsin-Madison are the major developers. So I guess you could say it was built by higher ed for higher ed," says Webb. "We know we have an ecosystem of great universities that are contributing to the open-source initiative, supporting it and providing additional features to keep this product innovative."

Making a Difference

SocialCoding4Good is running a pilot program with the following nonprofit organizations that develop so-called humanitarian free and open-source software:

- **Benetech** (literacy/education for people with print disabilities, environmental conservation and human rights)
- **Code for America Brigade** (civic engagement)
- **FrontlineSMS** (disaster relief, healthcare and human rights)
- **Mozilla Foundation** (education)
- **The Guardian Project** (human rights)
- **Amara,** formerly Universal Subtitles (accessibility and education)
- **Wikimedia Foundation** (education)

SOURCE: WWW.SOCIALCODING4GOOD.COM

Open source is the new X factor in software selection. More than 50% of all software purchased will be open source by 2017, according to a 2012 survey of 740 enterprises released by a collaboration of 26 open-source companies. That finding signals a tipping point for open-source software adoption in the enterprise and nontechnical fields such as the automotive, healthcare and financial services industries. Choosing the right open-source offering could be critical to an organization's success. But evaluating an open-source project holds more caveats and pitfalls than picking traditional software. IT departments must consider the culture of the open-source community, the quality and timeliness of releases, the project's governance model and the availability of support. They also have to consider whether, and to what degree, they're willing to contribute code and fixes back to the community.

Here, organizations that have successfully adopted open-source systems share the criteria they used to evaluate projects and their philosophy about giving back to the open-source community.

'Projects' vs. 'Products'

Many IT departments evaluate open-source systems the same way they assess commercial products. They look for tools that offer superior functionality and lower maintenance and support costs. Many also turn to open source to escape vendor lock-in, foster sustainability within the IT infrastructure and spur innovation in IT operations.

James Webb

But there are other things to consider when looking at open-source systems, such as the culture of the community, the consistency of the product's quality, and how quickly the community responds when security fixes and patches are needed.

"It's important to evaluate smaller, open-source *projects* differently than larger, corporate-sponsored open-source *products*," says Tomas Nystrom, a senior director and global lead for open source at Accenture.

There are hundreds of thousands of small open-source projects or libraries, such as NAS and Spring, that rely heavily on user communities. Then there are open-source products, such as Red Hat Linux, which are managed by, and often owned by, companies that are in the business of selling software.

Sprint Nextel decided that a well-established product would best meet its needs when it ventured cautiously into open source, having grown tired of paying vendors millions of dollars in maintenance fees for Web and application server software, even as the need for support declined.

"We had built an internal team who was responsible for the Web and apps servers, and we believed we could move to an open-source product and still be successful," recalls Alan Krause, director of enterprise application integration at Sprint. But going it alone was a scary proposition for the CIO and a vice president, who both wanted the security of having a vendor to lean on if problems arose.

"There really was some trepidation there," Krause recalls. So the organization chose JBoss Enterprise Application Platform as its new middleware and Red Hat Enterprise Linux as its new operating system. It also used Red Hat's consulting team to help with implementation and let a Red Hat relationship manager serve as liaison with the open-source community.

"We're kind of dipping our toe into open source," Krause says. "We're still paying some maintenance for it, but it's significantly cheaper than what we were paying before."

When looking at open-source products like Red Hat, the selection criteria are no different from those that apply to commercial software, Nystrom says. "They're considered to be normal vendors with high-quality products that are comparatively cheap."

As open-source products gain traction at companies like Sprint Nextel, IT departments will feel more comfortable turning to smaller, open-source projects to foster innovation, Nystrom says. "If you're building something custom, it's typical that you use [open source] somewhere during development," he says. "It's almost impossible not to use it if you want to build a very modern application."

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In such cases, Nystrom recommends a bottom-up approach for choosing open-source projects.

"Developers and architects know what the communities are like and which are the libraries that are in much use today," Nystrom says. "They have a clearer view of which library we should use for which purpose, or which version of some type of persistent API we should be using here, or what's the best log-in library. So you can narrow down the number of libraries that are relevant for the enterprise very quickly — from hundreds of thousands to probably less than 100, depending on what you want to build." And from there it's a quick move to a few "usual suspects," he adds.

Tomas Nystrom

West Texas A&M chose the CAS project for its single sign-on system because CAS had been successfully deployed at Texas A&M University in College Station "and the references were solid," Webb says. His team also attended user events and higher-education conferences related to CAS as part of the decision-making process.

It Takes a Village

For many open-source projects, the developer community is the lifeblood of the software, and those who are new to open source should know that these communities all operate differently.

The well-established Linux community, for example, has operated under founder Linus Torvalds' "benevolent dictatorship" since its inception. But developers of new projects often keep tight control of their communities as well.

WibiData, a Hadoop-based user analytics company that helps organizations build big data applications, provides part of its software stack as open source to make it easier for developers to build big data applications on an HBase NoSQL database.

"Right now, 99.5% of the software is written by our own team," says Aaron Kimball, chief architect at WibiData. "It takes a relatively long time to get people to use it, and for every 50 people who use it, one might start helping to contribute."

Then there are the radically democratic models. Developers who donate a product to the Apache Software Foundation, for instance, must reach a "lazy consensus" with the community, which means "you need some number of individuals to give your idea a thumbs-up and for nobody to give it an explicit thumbs-down — and if they do, they are obligated to work with you to make the changes," Kimball says. "It's designed to slow things down in some ways so all users can be invested in this and through consensus arrive at the best solution." Although the developers who participate most actively in writing source code are expected to be the ones who are listened to first, he adds.

Is It Better to Give Than to Receive?

IT departments might think that when they buy into open source they also have to actively participate in the community to ensure its survival. But that's not always the case.

With widely used open-source products like Red Hat, "[vendors are] very much in control of the community," Nystrom says. And while they do take from the community, "they still control the product," he adds. "They're not dependent on the community for the product to be stable and go forward."

Sprint Nextel currently relies on Red Hat consultants as its liaison with the open-source community, but Krause believes the company will need less hand-holding as time goes by. "We will eventually move away from Red Hat being our support system

OPEN SOURCE *Gives* BACK

SEVERAL NONPROFIT open-source organizations now help companies give back to the community by providing their programmers with opportunities to volunteer their time and talents to benefit social causes.

Through the work of nonprofit organizations such as Benetech, FrontlineSMS, The Guardian Project, Mozilla Webmaker and Wikimedia Foundation, so-called humanitarian free and open-source software has emerged as an important tool in tackling global social challenges, including civic engagement, disaster relief, education, healthcare and human rights.

Several tech companies already connect their technologists with opportunities to contribute their skills to projects that benefit social causes – as VMware does through its #ContributingCode initiative, for example. But any company can get involved in such initiatives.

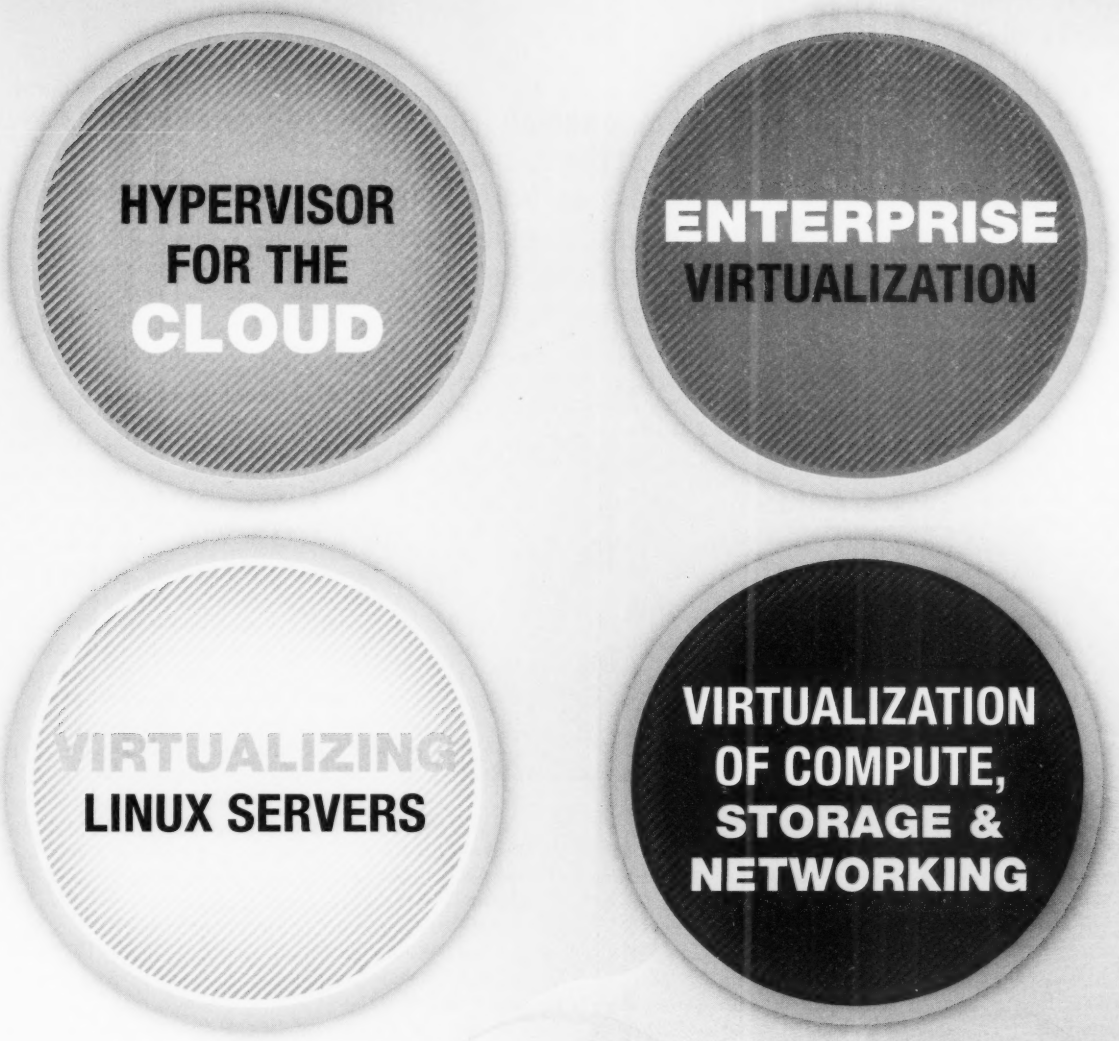
What can companies and employees gain by giving back? Plenty, according to one of several nonprofit groups that organize open-source projects to improve the lives of people worldwide.

"It creates a tremendous professional development opportunity for employees," says Gerardo Capiel, vice president of engineering at Benetech, which sponsors open-source projects benefiting literacy and education, environmental conservation and human rights. Some programs leverage their company's existing technologies and can influence how they affect the world. Others let programmers choose their own cause from a list of nonprofits.

Contributing to social change can have an impact on employees, as well. Programmer Abhi Mahule was looking to donate his skills and time to a cause when he learned about Benetech, which wanted to build an Android-based e-book reader for the visually impaired. Mahule took an existing open-source e-book reader and adapted a version for Android that could "read" books aloud as audio. He built a prototype, and Benetech secured funding from the U.S. Department of Education to bring it to market. Today, thousands of people use the app, Capiel says.

The project "helped me [hone] my technical skills," says Mahule, but adds that the intangible benefits were more significant. "It was a source of joy and a nice feeling that in a small way you're able to contribute," he says. "You should always look out for a larger cause for the greater good. This is the perfect opportunity for that."

– STACY COLLETT



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and work directly with the open-source community," he says.

For users of smaller open-source libraries or projects, communities are much more important.

"There's just a group of people who put this together, and there might not be a commercial entity behind it," Nystrom says. In these cases, developers are expected to contribute, but what if they refuse?

One open-source user says it's hard to contribute, or "pay it back," when the product is industry-specific.

When Hallmark Services Corp. (HSC) in Naperville, Ill., was overhauling its back-end systems, it bought a license for the open-source code of Healthation, a commercial off-the-shelf system for administrating healthcare business transactions.

Taking an open-source approach reduced the amount of labor required to complete the project, enabling HSC to finish more than nine months early and save $4.8 million in labor costs, according to Neal Kaderabek, CIO and vice president of financial services. HSC is a co-developer of the software with Lisle, Ill.-based Healthation, and it has the right to exclusive use of functionality that it developed — it doesn't have to make it available as open source.

"We rarely check anything back in — we just take it out, modify it and make it unique to our business," Kaderabek says, adding that HSC shares less than half of what it develops with the community. "Frankly, we think that sets us apart from our competitors, so why would we want to let the world share it?"

He acknowledges that Healthation was disappointed that HSC wasn't contributing to its open-source community. "Their view was that's what makes their product more attractive to the industry. But in this case, I just felt like it was our secret sauce," he says.

That's not often the case, industry-watchers say. Most open-source applications are essentially commodities, and the platform itself doesn't usually hold many trade secrets.

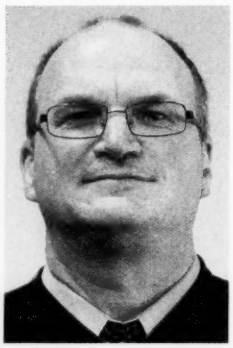
HSC processes $3.5 billion worth of insurance premiums annually and provides services to about 1.5 million retail insurance members.

The company chose Healthation because it was the only healthcare transaction software Kaderabek knew of that was available as open source. With Healthation, HSC could kick-start its IT transformation project because the majority of new core functions were already in place and the IT team had to customize only about one-third of the system.

"This [open source] out of the gate was leaps and bounds ahead of the design and architecture" of traditional software systems, Kaderabek says. "It was built on latest and greatest technology; it used Web services; it was .Net using SQL server — which all met our standards. We got more done in a shorter period of time and didn't have to add extra resources," he says.

Kaderabek says that even when evaluating small or industry-specific open-source projects, IT shops should look for vendors that specialize in maintaining an open-source offering. "Make sure there's somebody out there who can say, 'I've done this for the last five years, and I know people who have done what you're doing,' in case you need help," he says.

> **This [open source] out of the gate was leaps and bounds ahead of the design and architecture [of traditional software].**
>
> **NEAL KADERABEK,** CIO AND VICE PRESIDENT OF FINANCIAL SERVICES, HALLMARK SERVICES CORP.



When It's OK to Give It Away

Contributions to an open-source community don't have to be huge to be valuable. "If there's a low-level feature that's a more convenient way to do something — that saves everybody time," says WibiData's Kimball. "Sometimes even small changes that may not take more than an afternoon to write will have an outsized benefit on usability."

WibiData initially developed its entire software stack alone, but in September 2012 it decided to make part of that stack available as open source and released the Kiji project in November.

Offering some tools as open source benefits WibiData in several ways, most notably by broadening the company's user base, says Kimball. Fundamental layers of the stack have a low value, and users won't pay for tools that aren't unique to their business, especially if similar tools are available. Open-sourcing those layers introduces new users to other WibiData offerings. "There are plenty of people who can make use of these components who [weren't] customers or potential customers, but now they're using and testing the same software that our paying customers use," Kimball says. "So everybody enjoys increased reliability of the overall system by virtue of it being more widely adopted."

Moreover, open source provides a foot in the door to companies that might not be ready for a big-data tool yet. "If common-based layers of our overall system are widely available through open source, [developers] might just start using it. And later on, when their organization needs to get serious about using an open-source application, it's much easier for us to go in and sell to those business users because our software already runs on parts of their stack. Interoperating with it and getting it to work with the rest of our systems is much easier rather than if they had built this same system in a completely bespoke fashion."

Kiji has received only a few contributions from its developer community so far, but Kimball believes that will change. "For every 15 people who use it, one might file a bug report — without providing a fix. But it's very early days," he says. "Where this goes is an open question."

The future of open source in general looks bright. Broader adoption will create larger communities for testing and feedback, which in turn will drive innovation in areas such as cloud computing, mobile and big data, according open-source vendors.

The innovation cycle is also creating new business models. "Open source is key to a company's ability to innovate and sustain innovation with financial benefits, interoperability and a supportive community," Webb says. "Those are the things that are going to keep it going." ◆

Collett *is a* Computerworld *contributing writer. You can contact her at stcollett@comcast.net.*

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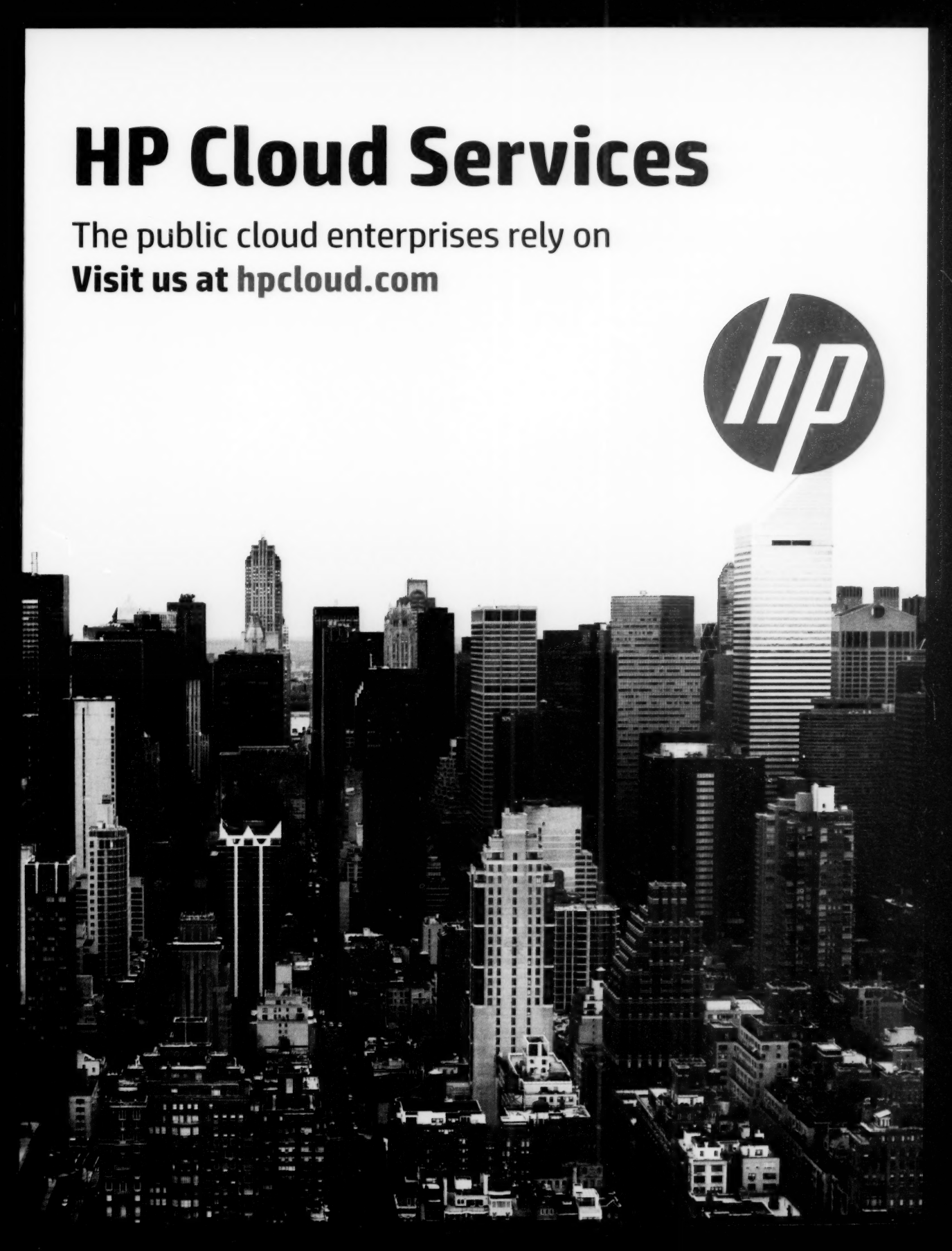

FREE (WITH STRINGS ATTACHED)

THE MOST ATTRACTIVE ASPECTS of open-source software can also be the most problematic: It's free and it's just a click away.

That means just about anyone in the office can introduce open source code into the company's IT infrastructure.

It's tempting for users to think, "It's free, so no big deal. IT won't be billed for it." But IT still has to manage open-source software — and that can't happen if IT doesn't know it's there.

"It's never a good idea to have no idea what your engineers or other employees are bringing

Open-source software is free, flexible and adaptable, but lax oversight can obliterate the benefits. Here's how IT is keeping track. **BY MARY K. PRATT**

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The risk might be limited, but if [people start] sucking in whatever they want, there can be issues. Open-source software comes with all sorts of strings attached.

CLARK D. ASAY, VISITING ASSISTANT PROFESSOR, DICKINSON SCHOOL OF LAW, PENNSYLVANIA STATE UNIVERSITY

into the company. The risk might be limited, but if [people start] sucking in whatever they want, there can be issues. Open-source software comes with all sorts of strings attached," says Clark D. Asay, a visiting assistant professor at Pennsylvania State University's Dickinson School of Law, whose research focuses on legal issues relating to the Internet and arising from technological change.

Each piece of open-source software has specific license requirements and possible restrictions. At the same time, the software should be documented and tracked to ensure that it's working properly. The problem is, many IT organizations aren't applying good governance practices to open-source software.

"The overwhelming majority of open-source assets used in corporate IT are either significantly undermanaged or completely unmanaged," says Mark Driver, an analyst at Gartner.

Driver acknowledges that management of open-source software is improving. He says surveys conducted in 2008 found that 75% of Global 1000 companies didn't have policies governing open-source software. Now, he says, 75% of companies reporting to him say that they do indeed have polices in place, although Driver says these polices aren't adequate.

"When I look at those policies, the significant majority are ineffective," he says, explaining that many require voluntary compliance or apply only to certain parts of the organization.

Yet CIOs face real dangers if they're not properly managing their open-source assets. They could get into legal tangles for failing to adhere to license restrictions. They could expose the infrastructure to security threats. Or they could find themselves scrambling to fix glitches in software they can't quickly identify because they have no reliable record of what it is.

Shaya Phillips

Steven Grandchamp has seen companies face serious problems because of lax oversight of open-source software. "It's proliferated so much and so fast that now you have organizations using it and they don't exactly know what they have or where it is. And if you don't even know you have it, then you can't manage or mitigate the risk," says Grandchamp, CEO of OpenLogic, a Broomfield, Colo., company that helps organizations manage open-source software.

For example, one OpenLogic client had problems with a back-end system that processed gift cards for a large retailer. The system crashed just before Christmas, leaving IT rushing to find the source of the glitch. Turns out there was an implementation problem with a piece of open source code that a developer — who had long since left the company — hadn't documented.

It's a classic example, Grandchamp says, of IT neglecting to count open source code as a key asset and therefore failing to mitigate the risks that come with it.

"For some reason, it has escaped the traditional management channels. It escapes procurement almost completely because [it's free]. And it escapes a lot of technical evaluation because developers can just download it," he says.

Shaya Phillips, associate vice president for IT at Fordham University, says his IT department knows what can happen when open-source tools aren't managed properly, so it's trying to get ahead of that problem.

He and his colleagues see value in open source — it's free, flexible and adaptable. But they're also aware of the challenges involved in maintaining it. Phillips, who is active in the Society for Information Management, says it's tough to determine when to contribute changes to the open-source community, when to make updates and patches, and when to pay for support services.

To balance the risks and rewards, Phillips says his IT department has decided to steer clear of open source for core systems, such as those running student registration, financials and human resources, unless the university can buy support contracts for it. On the other hand, Phillips says open-source software supports the high-speed innovation that IT needs for a growing body of applications, such as mobile tools.

And when open source is in the picture, governance is essential, he says. The university's information security office reviews open source code proposed for use to ensure that it's secure and that the university meets the licensing terms. The project management office tracks the code, following the ITIL standards set up by the software development office. Programmers must document what they use where and what modifications are made.

"We use our own protocols. We document what we did, what we used, give proper attribution. We have approved programming standards," says Phillips, adding that staffers are asked to share any new code they write with the open-source community.

Fordham's IT department tracks all of its software using Subversion, an open-source version-control tool. Phillips says he can't point to any specific problem that has been avoided to prove that such attention pays off. "But I'm sure we will," he says. "Already it's proved itself in that we know when people are working on the wrong version of software."

Mitigating the technical risks posed by open-source software is one reason IT has to do a better job of governing it. Making sure the organization complies with all licensing and legal requirements is another, Asay says.

Asay says some developers might still think that "open source" means "in the public domain" and that using open source code won't infringe on anyone's intellectual property rights. But, in

fact, open-source software comes with copyright protection, and licenses specify how the code can be used.

There are numerous open-source licenses, with the GNU General Public License being the most widely used. The licenses generally specify if or when you have to publicly disclose the code's use, attribute it, and/or contribute changes and modifications back to the community from whence the code came.

Asay explains that restrictions and requirements most often come into play when the entity using the open source code distributes the final software package to someone else.

"If people are just pulling it in and there's zero chance it will make it out the door, no one will know about that use, so you don't have license obligations. Distribution is the trigger that makes the license obligations real," he says.

But in this day and age, when so many IT organizations develop apps for customers to use when interacting with companies, developers may cross that distribution threshold more often than they realize, Asay says. And that could mean legal trouble.

"You have this culture [that thinks] 'Hey, we're free to use it. We can avoid having to reinvent the wheel.' But if you don't follow the license conditions, then the copyright holder can bring an injunction and get statutory damages," Asay says.

Ramaswamy Nagappan, co-CIO at Pershing, says such risks are why open-source software needs as much management as — if not a bit more than — commercial software. And that's why Pershing has detailed protocols for when and how it uses open source.

Those protocols first require that the open source code proposed for use undergoes a legal review to check its licensing terms and contribution requirements, and to determine if there's any threat of IP or patent infringement. (Nagappan notes that commercial software also goes through a legal review, but that happens later in the procurement process.)

"Then we do a small pilot. A small team downloads it, they make sure it's working, then goes into the development cycle — they test it and make sure there's no bug. It's like a proof of concept," he says, noting that IT also looks at the total cost of ownership and compares it against the TCO of comparable commercial products.

If it passes all those checks, the code then becomes part of the company's catalog of open-source options, which are tracked in Pershing's own free and open-source software management application. That ensures that "people don't download something that does the same function as something we already have," he says.

Karim R. Lakhani

Karim R. Lakhani, an associate professor at Harvard Business School who has extensively studied the emergence of open-source software communities, says more organizations are developing strong management policies, aided by evolving tools and service providers. But more organizations still need to take up the charge.

"IT executives do need to pay attention to this and create an inventory of code they've brought in, with what the licenses are. But most organizations don't have good control over what their obligations are, both to the commercial sector as well as to the open-source sector," he says. But they should, he adds, noting that "software, both open source as well as commercial, comes with a lot of encumbrances." ◆

Pratt *is a* Computerworld *contributing writer in Waltham, Mass. Contact her at marykpratt@verizon.net.*

Checklist OF BEST PRACTICES

CIOs LOOKING TO FORMULATE and enforce open-source software management policies should first stop segregating open-source applications from commercial applications, says OpenLogic CEO Steven Grandchamp.

"Remove the 'open source,' because open-source software is just software," he says, adding that the best practices that IT uses when managing commercial software apply to open source code, too.

But Grandchamp and others say open-source management protocols benefit from other strategies too. He and others recommend the following:

- **Start with a detailed policy.** "You have to make some statements about what you're willing to do and not willing to do," Grandchamp says. "The big thing about the policy is understanding the risk tolerance of the company, because it really should be a risk-based policy."
- **Understand the licensing terms** of the various open-source tools that your organization is using or might consider using.
- **Track open-source software once it's in the door.** It's especially important to "make sure it's patched," says Gartner analyst Mark Driver.
- **Conduct a sample scan or audit.** As is the case with financial audits, it's impossible to conduct a comprehensive check of everything that's done using open source, but you can look at a sampling of uses and make sure they meet all the applicable guidelines, says Grandchamp.
- **Use a compliance checklist.** Sources such as Apache Software Foundation or the Linux Foundation have examples that you can follow.
- **Check applications you distribute externally to see if they use open source code.** As Penn State assistant professor Clark D. Asay points out, many open-source license requirements are triggered when code is distributed to users outside of your organization.
- **Develop a system to identify open-source software that could be of value to your organization.** This system should take into account your needs, the software's capabilities and license requirements and restrictions, Driver says. "Sometimes you have a good fit for code but not a good fit on the license," he says. "Not all open-source licenses are created equal."
- **Devise a strategy** for how your engineers will work with and engage the open-source community.
- **Communicate policies throughout your entire organization.** "It can't be just in IT, because you might have people in other departments downloading it," Driver says.

– MARY K. PRATT

SPRING TRAINING *for* BI Experts

It's a whole new ballgame for traditional data analysts, as training focuses on deep knowledge of statistics and computer science.

BY JULIA KING

ASK A DOZEN CIOs what tops their list of strategic priorities and odds are exceedingly good that "big data" ranks either first or second. One of the greatest challenges, they'll tell you, is finding the talent they need to analyze and wring business value from the ever-increasing volume of complex data flooding their enterprises. What they need, they say, are good data scientists — and lots of them.

In one of the most frequently cited reports on the topic, the McKinsey Global Institute estimates that there will be a shortfall of 190,000 data scientists in the IT job market by 2018.

GETTY IMAGES / THINKSTOCK

But how exactly do you become one of these in-demand big data specialists? Is it a matter of training, certification or both? Is it simply the next logical career step for a traditional business intelligence expert? Is a computer science degree required?

As it turns out, there is no one right answer, at least not at the moment. Instead, it's largely a scramble out there on the big data field.

"Big data is like a kids' soccer game. Everyone is running to the ball, but no one knows exactly what to do with it. It has created a huge competition for people," says Greg Meyers, CIO at Biogen Idec in Weston, Mass.

"It's a very fluid area," agrees Michael Rappa, executive director of the Institute for Advanced Analytics at North Carolina State University. "Depending on what industry you're in or what company you talk to, it's a different reality when you talk about big data."

While a single definition might be elusive, academic, career and business experts agree that there are certain fundamental tasks that all data scientists need to perform and certain skills that are required to perform them well. The main pillars of the discipline are data clustering, data correlation, data classification and anomaly detection.

Or, as Rob Bird, a data scientist and CTO at Red Lambda, a provider of predictive security analytics, puts it, "You make data simpler, find relationships, find the weird stuff, and then make predictions."

Universities Step Up

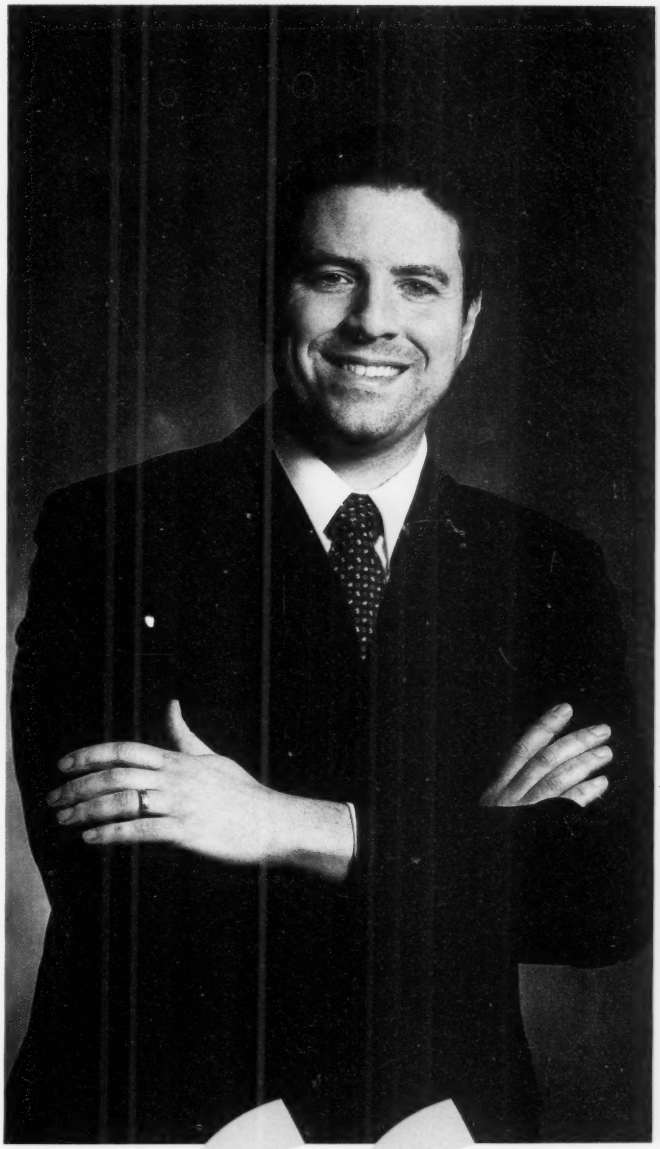
The skills required to perform these tasks cut across traditional academic disciplines, including statistics, mathematics and computer science. This is why several schools, including New York University and NC State, offer specialized data scientist certification and degree programs.

"Data used to be something you collected. It had neat rows and columns," explains Rappa. "You ran experiments that were time-consuming, laborious and costly, and you didn't have a lot of data so you dealt with sample sizes."

Now, in contrast, "data comes streaming off of every touch point you have with employees, partners and customers," he says. "Big data is about taking all of that data together and using it to optimize business or inventory levels or to better target customers. That's the trick of the whole thing. You need people who are good at handling large volumes of data and have knowledge of math and statistics to analyze the data."

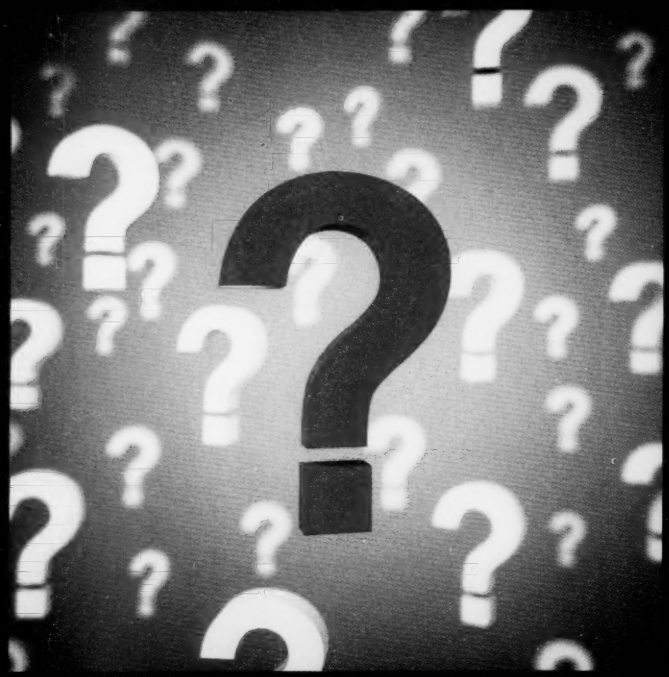
Recognizing this as early as 2005, NC State created the Institute for Advanced Analytics, which pulls together faculty members from various disciplines and teaches data science "in a very integrated way," Rappa says. Students take technical courses in statistics, finance and business, and they learn communications and teamwork skills, which Rappa says "almost always trump the technical skills," as far as employers are concerned.

Teamwork skills are critical, he says, because "you



Big data is like a kids' soccer game. Everyone is running to the ball, but no one knows exactly what to do with it. It has created a huge competition for people.

GREG MEYERS, CIO, BIOGEN IDEC



DATA SCIENCE VS. BUSINESS INTELLIGENCE:

What's the Difference?

THE TERMS "data science" and "business intelligence" seem to be used a lot in connection with big data, but they're really very different disciplines.

Experts say data science is all about predicting the future, while BI involves producing static reports.

"Traditional BI engineers are effectively reporting information as is, even if they're reporting trends and standard deviations away from the norm," says Andrew Dempsey, director of DVD BI and analytics at Netflix. "They aren't really discovering new nuggets of information. The data is what it is."

But with data science, there's an element of mystery. For example, Netflix looks at historical data "to identify why someone is more or less likely to churn because of their behavior," Dempsey explains. "There's more uncertainty there because on an aggregate level, a lot of people may have similar viewing habits, but on an individual level, everyone is different."

Another key difference between the two disciplines has to do with the data itself.

First, there's the sheer volume of data. "With so much data, you need to assimilate it to look at the exceptions, rather than the reports," says Biogen Idec CIO Greg Meyers. The pharmaceutical manufacturer, he says, continually reviews data from signals throughout the manufacturing process to detect when events are out of tolerance levels. When an anomaly is detected, a different operating procedure is triggered. "It's all about trying to make sure the process of how we manufacture is as controlled as possible," Meyers says. "We've matured our analytics process by looking at data across batches so we look at trends to reduce the variability of certain things."

Another challenge is dealing with the variability of big data.

Josh Williams, a data scientist at Kontagent, notes that "in classic BI systems, you usually have highly structured data – things like customer profiles. You come up with an analysis by correlating that data and running regressions on it."

In today's big data environment, in contrast, "you have a mess of complex data and you have no idea how the features you may be looking at – the input factors – relate to the output," Williams says. The upshot is that data science is "much more exploratory. It's easier to shoot yourself in the foot. You have to be much more rigorous. It's much more difficult to do the analysis, which is why there is so much more research around machine learning," he adds.

– JULIA KING

[In data science] you need people who are good at handling large volumes of data and have knowledge of math and statistics to analyze the data.

MICHAEL RAPPA, EXECUTIVE DIRECTOR, INSTITUTE FOR ADVANCED ANALYTICS, NORTH CAROLINA STATE UNIVERSITY

can't wrap up all of the [data scientist] skills you need in a single person." (See "Stalking the Elusive Data Scientist," page 14.) Instead, data scientists typically work in teams. IBM, for example, mixes statisticians with MBAs in its Data Analytics Center of Excellence, which helps businesspeople determine what questions they need data to answer. The center's goal is to generate revenue through a marriage of business savvy and analytics, says CIO Jeanette Horan. One project optimized sales coverage in the 170 countries in which IBM operates, yielding a 10% performance improvement in territories where the models were applied.

THINKSTOCK

The intensive NC State program, which students attend all day, five days a week for 10 months, awards graduates a master of science degree. Rather than completing a final thesis, students work in teams to complete practicum projects with live data from major companies, including GE and GlaxoSmithKline. Seventy percent of the program's students come from the workforce, many of them sponsored by their employers. Most students have at least two years of on-the-job experience, and their average age is 29. The program costs $21,000 for North Carolina residents and $36,000 for everyone else.

At NYU, the newly launched, two-year master of data science degree is also multidisciplinary, intersecting mathematics, computer science and statistics. This is because to do data science well, "you need to have expertise in all three," says Roy Lowrance, managing director of the university's Center for Data Science.

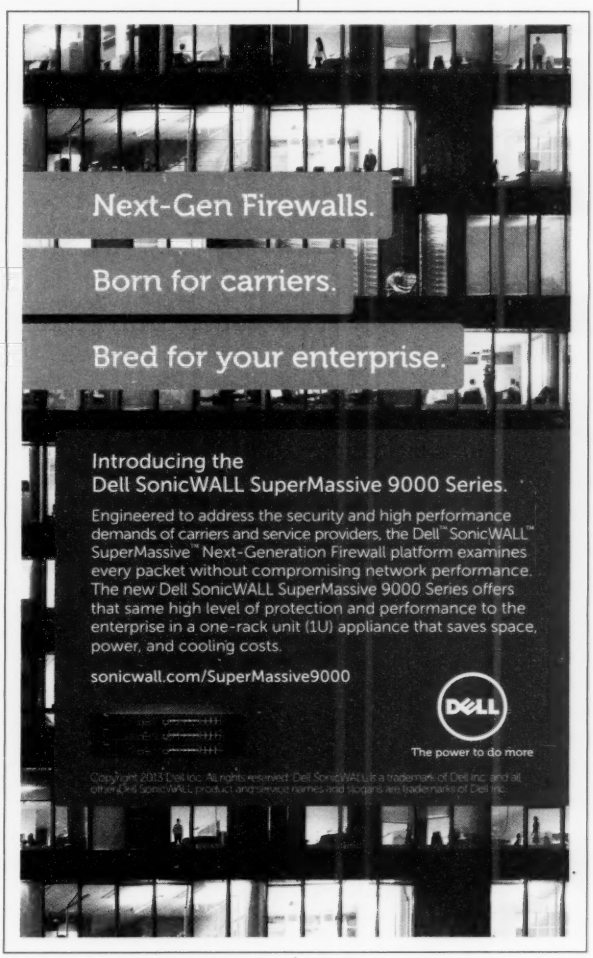
Lowrance emphasizes that data scientists also require what he calls "application knowledge." Without it, "you have no intuition about what to work on and test, especially in business," he explains.

What Lowrance refers to as application knowledge, some other experts describe as domain expertise. But whatever you call it, all agree that it's absolutely essential for data scientists in the business world.

Because data scientists are charged ultimately with showing business value, knowing a particular business is critical "because there's a lot of nuance in each domain," says Josh Williams, a data scientist at Kontagent, a company that finds and identifies customer behavioral insights from social, mobile and Web data in real time.

"A data scientist is someone who is familiar with statistics and classical mathematical analysis, and they need a strong background in programming and computer science or at least the ability to get things done in a programming language," Williams says. "But they also need domain expertise around how to apply different automated analysis algorithms to a given domain."

However, he adds, "data science skills are not necessarily industry-transferrable" because the volume and complexity of data varies from industry to industry. "We're dealing with orders-of-magnitude greater volumes, but the really important part is that the data is much more rich and complex," Williams says.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Training Options

The optimal place to gain domain expertise is on the job. But for people interested in improving their technical skills, there are options beyond university programs.

"There are a lot of good math and statistics courses online, and many computer science courses online, too," says NYU's Lowrance. Additionally, vendors in the big data market, such as Cloudera, are developing extensive training programs for would-be big data professionals.

Cloudera offers instructor-led training both in classrooms and online. The training is segmented by professional roles, such as developer and analyst, and by application. For example, students might take a course in developing a recommendation system on Cloudera's big data platform.

One of Cloudera's most popular courses is geared to developers, primarily those using Java. "They may write MapReduce applications, taking a Web log, which is very often used because now it can be stored and analyzed," says Sarah Sproehnle, vice president of educational services at Cloudera. "[Then they'll] do a simple analysis, perhaps counting the number of times various IP addresses access their Web pages. From there, they can expand to forming a geographical look-up to see where their geographical Web activity is coming from."

Cloudera reports that it trained 15,000 developers in 2012, and it offers new classes every week, around the globe.

"The audience we're aiming for are not yet calling themselves data scientists," says Sproehnle. "They may be software engineers or statisticians, and they need to be equipped with what it takes to [operate] in this new big-data-driven environment."

The training does focus exclusively on Cloudera's big data platform, but it also covers more fundamental big data concepts, such as machine learning, classification and clustering, she says.

The company also offers a certification, which Sproehnle says "is beginning to appear on LinkedIn profiles and job descriptions looking to hire big data professionals."

"In technologies this young and new," she adds, certification "offers a level of comfort that [an applicant] has more to offer than that they read a few pages in a book." ◆

Security Manager's Journal

MATHIAS THURMAN

Plans Are Made to Be Revised

The company's incident-response plan needs to be updated. That's normal — no plan is carved in stone.

WE SECURITY MANAGERS are always documenting processes and plans. It's a task without end, because you have to dust off those documents every once in a while and think about how they could be updated. Organizations' needs are always changing, and so is technology, so what was a great plan a couple of years earlier might have some gaping holes now.

Such was the case with our incident-response plan. I had reason to review it recently, and it clearly needed modernization.

One thing I have learned over the years is that it's a mistake to start from scratch with these things. When you model a security program against a standard, it is likely to receive less scrutiny in an audit, since it will be in a form that is recognizable and accepted in the industry. That's why I decided to use the incident-response recommendations from the National Institute of Standards and Technology (NIST) as our starting point. Every organization will want to customize its plan for its own needs, but building on a widely used and solid framework is a big help.

JOIN IN the discussions about security! **computerworld.com/blogs/security**

With NIST's recommendations as our guide, we broke our incident-response process into four phases: preparation; detection and analysis; containment and eradication; and post-incident analysis.

Preparation is in many ways the most important phase. It includes identifying the members of the crisis action team (CAT). Besides representatives from information security, we wanted the CAT to include Windows and Unix engineers, network engineers, help desk personnel and local law enforcement officials.

Having chosen these people, we obtained full and redundant contact information for all of them, so we could be sure we'd be able to get in touch with them if there were an incident. Then we designated certain conference rooms to serve as "war rooms" and secured a dedicated call-in bridge and an email-enabled distribution list. In this phase we also lined up all the relevant tools we might need to detect or respond to incidents, including packet capturing, malware analysis, event monitoring and forensics tools. Finally, we identified trusted third parties to be on call in case we need expert assistance.

> **One thing I have learned over the years is it's a mistake to start from scratch with these things.**

Trouble Ticket

» Problem: The company's incident-response process is badly outdated.

» Action plan: Use a good model to modernize it, and plan to test it often so it stays up to date.

You can never know how a security incident will unfold. With that in mind, in the **detection and analysis** phase, we didn't try to enumerate every possible scenario. Instead, we listed common events that we see as major concerns. These include malware infestations, phishing attacks, unauthorized access, data loss, denial-of-service attacks and theft. We are also defining which sorts of events should trigger activation of the CAT. For example, a single PC hit by malware is insufficient, but the detection of malware that's quickly propagating could well require a full CAT response. To help us decide when the cavalry is needed, we are creating a matrix to lay out the criteria for escalation.

For the third phase, **containment and eradication,** we are establishing guidelines on whether an event requires evidence collection, damage assessment and identification of the attackers. We are also preparing checklists to help ensure proper eradication and containment of whatever malicious activity the incident involves. For example, a checklist might address what to do when a Windows server is compromised.

For the **post-incident** phase, we are describing how to ensure that we have gathered all the information necessary for criminal or administrative action, and we are including recommendations on post-mortems so we can identify what went well and what needs improvement.

Once the incident-response process document is complete, we'll start scheduling training sessions and then regular testing of the plan so we can maintain confidence that we are able to effectively respond to any incident. ◆

This week's journal is written by a real security manager, ***"Mathias Thurman,"*** *whose name and employer have been disguised for obvious reasons. Contact him at mathias_thurman@yahoo.com.*

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OPINION

PRESTON GRALLA

Microsoft's Smartwatch: Been There, Didn't Do That

This is shaping up as another example of Microsoft getting to a market first and failing to cash in.

APPLE, GOOGLE AND SAMSUNG are all said to be working on smartwatches. This is shaping up as yet one more example of Microsoft getting to a market first and then failing to cash in.

Various reports say Apple is working on what would presumably be called the iWatch. Because we're talking about Apple, there has been no confirmation of those reports, but as many as 100 product designers are said to be hard at work on it. Google's Android division may also be working on a smartwatch. Its offering, sources say, would work not only with Android smartphones and tablets, but with Google Glass as well. And Samsung has confirmed that it's working on a smartwatch.

With so much activity focusing on the intersection of technology and the human wrist, Microsoft is paying attention and is said to be making its own moves toward developing a smartwatch. But in Microsoft's case, that should read "developing a smartwatch again." That's because Microsoft pioneered smartwatches years ago, and then abandoned the concept.

Nearly two decades ago, in 1995, Microsoft and Timex co-developed the Timex Data Link watch, which wirelessly downloaded and displayed data from Windows-based PCs. Though worn by both astronauts and cosmonauts on space missions and given *Popular Science*'s Best of What's New Award and the *Popular Mechanics* 1995 Design and Engineering Award, it never made a dent in the market, and Timex and Microsoft abandoned it. Then in 2003, Microsoft launched its Smart Watch, which delivered news, weather, traffic information and more over FM frequencies. The Smart Watch was based on Microsoft's Smart Personal Objects Technology (SPOT), which was meant to be applied to an entire fleet of gadgets, from coffee makers to GPS devices.

That never happened. The watches were bulky and expensive (one model sold for $800), and the SPOT service required a $59 annual subscription. In 2008, Microsoft stopped selling the watches, while still supporting transmissions to existing ones. At the end of 2011, it pulled the plug entirely.

Now, in 2013, Microsoft finds itself not at the vanguard of a burgeoning trend, but playing catch-up. *The Wall Street Journal* says Microsoft has contacted parts suppliers in Asia to ship components for a smartwatch. No doubt the company has seen Gartner's estimate that the wearable electronics market will reach $10 billion by 2016.

Why is Microsoft following and not leading? One reason is that there's a disconnect between its substantial research capabilities and its product development efforts. Microsoft far outspends Apple and Google on research and development — its $9.4 billion budget is nearly double Google's $5.2 billion and more than triple Apple's $2.6 billion, according to S&P Capital IQ — and it has been the company with the world's largest R&D budget for the past 12 months. Clearly, Apple gets a far bigger bang for its buck when it comes to matching research to product development.

Another problem is Microsoft's protect-your-own-turf culture, which makes it difficult for it to develop products that span departments. And it doesn't help that Microsoft demands that all its products lead back to Windows. That bit of turf-guarding holds back innovation.

This all reminds me of what happened with smartphones and tablets. In both cases, Microsoft had the jump on Apple but couldn't cash in. It's hard to believe that things will be different this time. ◆

Preston Gralla is a *Computerworld.com* contributing editor and the author of more than 35 books, including *How the Internet Works* (Que, 2006).

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Career Watch

OT Extremes

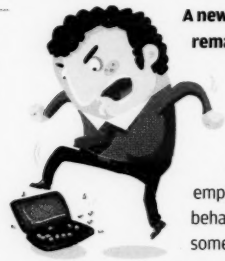
The top three U.S. cities in which respondents work more than eight hours of overtime per week

Philadelphia	47%
Boston	43%
Dallas	40%

The three U.S. cities in which the greatest percentages of respondents do not experience any overtime

Austin	66%
Charlotte	60%
Houston	50%

Less Stress for IT?



A new survey shows that, while stress remains high for IT administrators in the U.S., it's generally down from a year earlier. The independent blind survey of 207 IT administrators in U.S. organizations with more than 10 employees was conducted in March on behalf of GFI Software. Here's a look at some of the findings:

	2013	2012
I am considering leaving my job because of workplace stress.	57%	67%
My job is stressful.	65%	69%
I feel the same level of stress or more stress than others in my social circle.	62%	72%
I have suffered stress-related health issues such as high blood pressure because of work.	21%	20%
I have lost sleep because of work.	34%	42%

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ASK A PREMIER 100 IT LEADER

Cynthia Nustad

The CIO at HMS answers questions on the **job prospects for a mainframe programmer** *and more.*

What are the prospects these days for an unemployed mainframe programmer/analyst with 30 years of experience? We just had a very lengthy discussion on this topic at my company. We still successfully leverage the mainframe for some of our products and get great performance and scale from such equipment. One thing we considered in our discussion was whether there would be enough talent 10 to 15 years from now to work on those tools. Our vendor was able to put our minds at ease by telling us about universities that are growing their educational offerings to teach students these technologies. In short, I think the prospects continue to be good for experienced mainframe talent.

I have been considering a career in computer forensics and network administration. Any advice? These are very exciting areas in IT. I would recommend spending the time to get certifications pertinent to the specific areas you are passionate about. Yes, studying for certifications can be time-consuming, and clearing the testing hurdles is challenging. But certifications will set you apart from others trying to get the same job and will help advance your career. And because network administration and forensics are changing quickly, recently minted certs are a way of telling employers that you are keeping up to date.

I liken the network to the heartbeat of a company – you don't want it to skip a beat, so maximum uptime is imperative. That means security and risk management should be part of the discipline.

Finally, you should develop your skills in public speaking, presentations and communications. This is helpful for areas like these that are routinely audited and reviewed. And being able to clearly explain key aspects of these important areas – such as how they help drive business value – to executive leaders and other nontechnical people will also contribute to your success.

What are the best programming languages to be familiar with for someone entering the IT field today? Currently, there is tremendous employer demand in many programming areas. The key thing to do is ensure that your capabilities are well rounded. A programmer who can do analysis, create database structures, write clean code, create testing structures and clearly communicate all that has been done is a very valuable asset.

Businesses are seeing the data that they retain and analyze proliferate. That means that people who understand the programming used to support data and analytics are particularly in demand. If your interest lies in this direction, you should get to know and understand key new data technologies, ETL languages and business intelligence tools. If your passion is to create applications and systems, we seem to be looking for Java and .Net talent constantly. Lastly, I always suggest that you investigate and leverage open-source tools. They can be excellent options for certain needs.

If you have a question for one of our Premier 100 IT Leaders, send it to **askaleader@computerworld.com**, and watch for this column each month.

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#1615.526; distrib syst design & implement; algorithm dvlpmnt & implement; analytic & proactive prob solving; C, C++, Python, & Shell script; ntwrkng & TCP/IP; Unix; & large process syst.
#1615.5032 Java; algorithms; Java program on Android pltfrm; oo program; design & implement UI; data struct design; & MySQL.
#1615.4118 C, C++ or Java; oo program; web dvlpmnt, HTML, CSS, Jscript & AJAX; Unix or Linux environ; & data struct, algorithms, & sw design.
#1615.4088 C++ or Java; Jscript, HTML, & CSS; & client srvr, multi-browser dynamic front-end dvlpmnt.
#1615.3487 C & C++ in large scale data process proj w/STL; Python; Linux Shell; relational & non-relational databases; Matlab or R; large data mgmnt; MapReduce; parallel & distrib large-scale data process; mach learn for optimize; natural lang process; & data demo in HTML, XML, CSS, & Jscript.
#1615.5587 C, C++, Java, or Python; oo design; UNIX or Linux; & data struct, algorithms, data explore & sw design.
#1615.4002 research web-scale data analysis, AI, info retrieval, mach learn, UI & personalization; C/C++, multithread, & STL; AJAX, XML, XSLT; Python; SQL; Java; large-scale data index; materialized view; hashing, DHT, Branch & Bound DFS, dynamic program, mach learn for info extraction; AI algorithms, parallel & distrib compute; & MapReduce.
#1615.5283 design, implement, analysis, & troubleshoot on web scale distrib syst; real-time data process; large existing codebase; data mine & mach learn algorithms; data struct & algorithms design & complexity analysis; & program lang.
#1615.215 C &/or C++, STL, & multithread; UNIX script; MapReduce or Hadoop; stat analysis & R; large-scale data mining, mach learn, & info retrieval; & algorithms; publication process for intl conferences or journals.
#1615.5161; C, C++, Java or Python; algorithm design, data struct, & syst design; distrib compute, data mine, & multithread; architecting, design, dvlp, deploy & debug large-scale distrib data process syst; UNIX or Linux; distrib sys design & RPC protocols; TCP/IP; data base program, incl NoSQL architect; & I/O perf optimization & tuning.
#1615.4060 mach learn tasks; data analysis; C++; parallel computation; & data struct.
#1615.2090; C++, incl STL, & template metaprogram; Linux syst; algorithms; data struct; stat models; & natural lang process.
#1615.4476; C or C++; Java; multithread; Linux kernel internals; perf monitor & test IP ntwrkng; ntwrk control plane syst, OpenFlow, & GRE; layer-2, layer-3, or layer-4 ntwrk protocols & technologies; design of RESTful API; & design, implement, test, & maint of multi-component sw ntwrkng control.

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Consultant(s) (Domain) – **US** needed in Plano, Texas and various unanticipated locations throughout the U.S., to help conduct IT requirements gathering, define problems, provide solution alternatives, create detailed computer system design documentation, implement deployment plan, and help conduct knowledge transfer with the objective of providing high-quality IT consulting solutions. **(Req ID 117BR)**.

Consultant(s) (Infrastructure Management) - **US** needed in Plano, Texas and various unanticipated locations throughout the U.S., to analyze customer IT infrastructure environments, contribute to solution creation, design, deployment, support and maintenance, as per customer requirements. **(Req ID 119BR)**.

Consultant(s) (Products and Packages) - **US** needed in Plano, Texas and various unanticipated locations throughout the U.S., to help conduct IT requirements gathering, define problems, provide solution alternatives, create detailed computer system, design documentation, implement deployment plan, and help conduct knowledge transfer with the objective of providing high-quality IT consulting solutions. **(Req ID 120BR)**.

Lead Consultant(s) (Domain) - **US** needed in Plano, Texas and various unanticipated locations throughout the U.S., to anchor different phases of IT engagement including business process consulting, problem definition, discovery, solution generation, design, development, deployment and validation. **(Req ID 76BR)**.

Lead Consultant(s) (Infrastructure Management) - **US** needed in Plano, Texas and various unanticipated locations throughout the U.S., to anchor due-diligence of customer IT infrastructure environments, as well as the design, detailing and transition of the assigned IT processes/modules. Support deployment and issue resolution. **(Req ID 81BR)**.

Lead Consultant(s) (Products and Packages) - **US** needed in Plano, Texas and various unanticipated locations throughout the U.S., to anchor different phases of the IT engagement including business process consulting, problem definition, discovery, solution generation, design, development, deployment and validation. **(Req ID 82BR)**.

Principal Consultant(s) (Domain) - **US** needed in Plano, Texas and various unanticipated locations throughout the U.S., to lead the engagement effort for IT assignments, from business process consulting and problem definition to solution design, development and deployment. Lead proposal development. Travel required. **(Req ID 112BR)**.

Principal Consultant(s) (Products and Packages) - **US** needed in Plano, Texas and various unanticipated locations throughout the U.S., to lead the engagement effort for IT assignments from business process consulting and problem definition to solution design, development and deployment. Lead proposal development. Travel Required. **(Req ID 115BR)**.

Principal(s) - Management Consulting needed in Plano, Texas and various unanticipated locations throughout the U.S., to lead small proposals and multiple streams on complex proposals. Develop best in class proposals that present Infosys Point of View, approach and IT solution. Help identify clients and opportunities for the practice, present preliminary ideas and proposals to clients, lead engagements from launch to closure. Travel Required. **(Req ID 106BR)**.

Technology Architect(s) - **US** needed in Plano, Texas and various unanticipated locations throughout the U.S., to provide inputs on IT solution architecture based on evaluation/understanding of solution alternatives, frameworks and products. Will interact with clients to elicit architectural and non-functional requirements like performance, scalability, reliability, availability, maintainability. **(Req ID 87BR)**.

Technology Architect(s) (Business Intelligence) - **US** needed in Plano, Texas and various unanticipated locations throughout the U.S., to provide input on IT solution architecture based on evaluation/understanding of solution alternatives, frameworks and products. Will interact with clients to elicit architectural and non-functional requirements like performance, scalability, reliability, availability, maintainability. **(Req ID 95BR)**.

Technology Architect(s) (Enterprise Solutions) - **US** needed in Plano, Texas and various unanticipated locations throughout the U.S., to provide input on IT solution architecture based on evaluation/understanding of solution alternatives, frameworks and products. Will interact with clients to elicit architectural and non-functional requirements like performance, scalability, reliability, availability, maintainability. **(Req ID 89BR)**.

Technology Architect(s) (Mobility) - **US** needed in Plano, Texas and various unanticipated locations throughout the U.S., to provide input on IT solution architecture based on evaluation/understanding of solution alternatives, frameworks and products. Will interact with clients to elicit architectural and non-functional requirements like performance, scalability, reliability, availability, maintainability. **(Req ID 100BR)**.

Technology Architect(s) (SOA & EAI) - **US** needed in Plano, Texas and various unanticipated locations throughout the U.S., to provide input for best fit IT architectural solutions. Will interact with clients to elicit architectural and non-functional requirements like performance, scalability, reliability, availability, maintainability. Provide input on solution architecture based on evaluation/understanding of solutions alternatives. **(Req ID 94BR)**.

Senior Associate(s) - **Management Consulting** needed in Plano, Texas and various unanticipated locations throughout the U.S., to lead and contribute to different phases of IT business engagement including launch, delivery and closure; lead small and medium-sized projects or complex/key sections of engagements; track and ensure adherence to timelines, milestones and other operational/financial processes. Travel required. **(Req ID 118BR)**.

Interested candidates send resume to: Google Inc., PO Box 26184 San Francisco, CA 94126 attn: Keeshia Moultrie. Please reference job # below:
Technical Solutions Consultant (NY, NY) **#1615.6313** Integrate Google products w/customer technologies. Exp. incl: Java & C++; program in Linux, Unix & Windows environ; troubleshoot revenue-impact applications; implement revenue-impacting technological prod or pltfrms; oo design & dvlpmnt; SQL & relational databases; script lang; commercialize prod or business onboarding of applications; & provide technical guidance or expertise across various technology groups.
Technical Account Manager (NY, NY) **#1615.4913** Provide technical support for Google's sales team and strategic partners to ensure the development and launchof new company products. Exp incl: search engine, video, mobile, e-mail & telephony industries; UNIX or GNU/Linux syst admin & shell script; HTML, HTTP, SSL, or TCP/IP; XML &/or XSLT; large-scale technical proj mgmnt or sw dvlpmnt in internet space; program lang, incl, Java, C, C++, Jscript, Python, or PHP; & implement sw & syst tests.
Software Engineer (NY, NY) **#1615.3568** Design, develop, modify, and/or test software needed for various Google projects. Exp incl: large-scale distrib syst; data struct & algorithms; sw test methods; & oo program lang, incl C++, Python, or Java.

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Sr. Software Engineers: Dsgn, dev & test systems in client server, multi-tier & Web envir using skills such as PowerBuilder, Oracle, PL/SQL, SQL Server, C#, VB.Net, SSIS, SSRS, PostgreSQL, etc.
Sr. Systems Analysts: Plan, estimate, impact analysis, Database desgn & modeling, Performance tuning, Data migration, Cognos reporting using skills such as Oracle, PL/SQL, SQL Server, DataStage, Quality Stage, Informatica, SSIS, Cognos Analysis & Report Studio, etc.
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Manager. Job location: Miami, FL & any other unanticipated locations in the U.S. Travel Required. Duties: Design & develop ETL solutions using Oracle ODI & Informatica. Design & develop Master Data Mgmt. Solutions using Oracle Data Relationship Mgmt. (DRM). Develop & deliver long term strategy for Data Integration standards in conjunction with data users, clients & stakeholders using ODI & DRM. Est. methods & procedures for tracking data qual., completeness, redundancy & improvement. Create short-term tactical solutions to achieve long-term objectives & an overall data mgmt.. road map using Visio. Identify & develop opportunities for data reuse, migration or retirement of systems. Requires: M.S. degree in Comp. Sci., Eng. or related field & 2 yrs. exp. in the job offered or 2 yrs. exp. as a Software Eng. Concurrent exp. must incl.: 2 yrs. exp. developing ETL solutions using Oracle ODI & Informatica. Send resume (no calls) to: Michelle Ramirez, The Hackett Group, Inc., 1001 Brickell Bay Dr., Suite 3000, Miami, FL 33131.

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User Interface Designer (Mountain View, CA) **#1615.4469** Define the user model and user interface for new and existing Google products and features. Exp incl: graphic design; CSS & HTML; & Adobe Photoshop &/or Fireworks.
Research Scientist (Mountain View, CA) **#1615.3729** Research, develop and test Google products. Exp incl: prog analysis algorithms & data struct; logic program lang; & databases &/or relational algebra.
PSO Technical Account Manager (Mountain View, CA) **#1615.3393**: Provide technical support for Google's sales team and strategic partners to ensure the development and launch of new company products. Exp incl: C++, Java or Python; XML, HTML, SQL, &/or Jscript; UNIX &/or Linux; mgmnt of technical prod initiatives; mgmnt & business negotiation; & internet products & technologies.
Quantitative Analyst (Mountain View, CA) **#1615.3867**: Research methods for improving search engine company technology. Exp incl: stat forecast, simulation, &/or optimization; oper research; program; C++ & Python; & R, SAS, & MatLab.
Product Manager (Mountain View, CA) **#1615.371**: Take responsibility for Google product from conception to launch. Exp incl: bldng & scaling of complex & mission critical solutions; large scale distrib syst & high availability syst; & dvlpmnt of internet products & data security solutions.
Software Engineer in Test (Mountain View, CA) **#1615.5223** Design, develop, modify, and/or test software needed for various Google projects. Exp incl: C &/or C++; large scale sw proj; Java; & Perl.
Test Engineer (Mountain View CA) **#1615.6090** Design, develop, modify, and/or test software for various Google projects. Exp. incl: dvlpmnt of test automation; C++, Java, or Python; sw testing, incl black & white box; relational databases & SQL; test functional test proj; data struct & OOP; & Agile methodologies.
Business Systems Integrator (Mountain View CA) **#1615.5624** Design analytical solutions that answer complex business decisions. Exp incl: dvlpmnt of syst or applications in C or C++ program lang; dvlpmnt of syst or application in Java prog lang; dvlpmnt of systems or applications using Unix based oper syst; dvlpmnt w/VoIP telephony protocols, incl SIP & RTP; dvlpmnt of large scale distrib, high avail, multi-thread syst; SQL & relational databases; requirements analysis in customer-driven environ; Agile dvlpmnt methodologies & proj life cycles; & dvlpmnt & debug.
SW Eng Positions (Mountain View, CA): Design, develop, modify, and/or test software needed for various Google projects. Exp. incl:
#1615.3670: large scale distrib syst & high availability srvcs; dvlpmnt of Jscript & crossplt frm HTML/CSS; web stack from browser/user agent to srvr; & internationalization & localization techniques to make content avail in multiple lang.
#1615.4137; Java & Jscript; Unix oper syst; QA/testing; oo design; data struct & storage technologies; algorithm dvlpmnt & implement; UI design & implement; & large-scale distrib syst.
#1615.4538 UNIX, Linux, & Shell; oo program, incl, C &/or C++; Java; parallel & distrib syst; funct lang; multi tiered web srvc architecture & web technologies; ntwrk program & TCP/IP; data mining, info retrieval, data process, & stats; UML model; & databases, incl MySQL.
#1615.212 dvlpmnt of consumer web or mobile applications; high perf srvrs; data analysis & natural lang process; & C++ & Java.
#1615.1719 data struct, algorithms & mach learn; analyze & troubleshoot large-scale distrib syst; IP ntwrkng, ntwrk analysis, & perf & application issues using standard tools; & UNIX syst admin, incl scripting.
#1615.5645 oo prog; C &/or C++; syst API design; problem & perf analysis of large scale distrib syst; & large-scale parallel & distrib compute, large-scale file syst, or large-scale sparse database.
#1615.4199: C, C++, or Java; stat analysis tools, incl Matlab or R; & mach learn techniques, digital signal process, estimation & detection theory, probabilistic graphical modeling, probability theory, & random processes.

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Project Managers-U.S. needed in Plano, Texas, and various unanticipated locations throughout the U.S. to help gather requirements, define architecture, and determine scope to deliver IT solutions. **(Job# 74BR)**.

Project Managers-U.S. (Enterprise Solutions) needed in Plano, Texas, and various unanticipated locations throughout the U.S. to help gather requirements, define architecture, and determine scope to deliver IT solutions. **(Job# 78BR)**.

Project Managers-U.S. (Business Intelligence) needed in Plano, Texas, and various unanticipated locations throughout the U.S. to help gather requirements, define architecture, and determine scope to deliver IT solutions. **(Job# 83BR)**.

Project Managers-U.S. (Testing) needed in Plano, Texas, and various unanticipated locations throughout the U.S. to perform activities to ensure that quality software work products are delivered on schedule, including coordination with clients and internal teams across the globe. **(Job# 88BR)**.

Project Managers-U.S. (Engineering) needed in Plano, Texas, and various unanticipated locations throughout the U.S. to help in application of industry standard methods for development to perform design tasks in concept design, preliminary design, detailed design, and testing support phases of the product development. **(Job# 85BR)**.

Project Managers-U.S. (Infrastructure Management) needed in Plano, Texas, and various unanticipated locations throughout the U.S. to help design, develop and deploy IT solutions for infrastructure environments, including evaluation of OS, DB, storage, network enterprise applications and middleware. **(Job# 92BR)**.

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Technology Leads-U.S. (Business Intelligence) needed in Plano, Texas, and various unanticipated locations throughout the U.S. to design, develop, test and deploy specific modules for software products. **(Job# 107BR)**.

Technology Leads-U.S. (Enterprise Application Integration) needed in Plano, Texas, and various unanticipated locations throughout the U.S. to design, develop, test, and deploy specific modules for software products. **(Job# 109BR)**.

Technical Test Leads-U.S. needed in Plano, Texas, and various unanticipated locations throughout the U.S. to test assigned modules for software products. **(Job# 103BR)**.

Technology Leads-U.S. (Engineering) needed in Plano, Texas, and various unanticipated locations throughout the U.S. to design, develop, test and deploy specific modules for software products. **(Job# 110BR)**.

Technology Leads-U.S. (Infrastructure Management) needed in Plano, Texas, and various unanticipated locations throughout the U.S. to design, develop and deploy IT solutions for infrastructure environments, including evaluation of OS, DB, storage, network enterprise applications and middleware. **(Job# 114BR)**.

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Interested candidates send resume to: Google Inc., PO Box 26184 San Francisco, CA 94126 attn: Keeshia Moultrie. Please reference job # below
Quantitative Analyst (Pittsburgh, PA) **#1615.5555**: Research methods for improving Google technology. Exp incl: large data sets using stat sw, incl R, S-Plus, or Matlab; & large databases, incl SQL.

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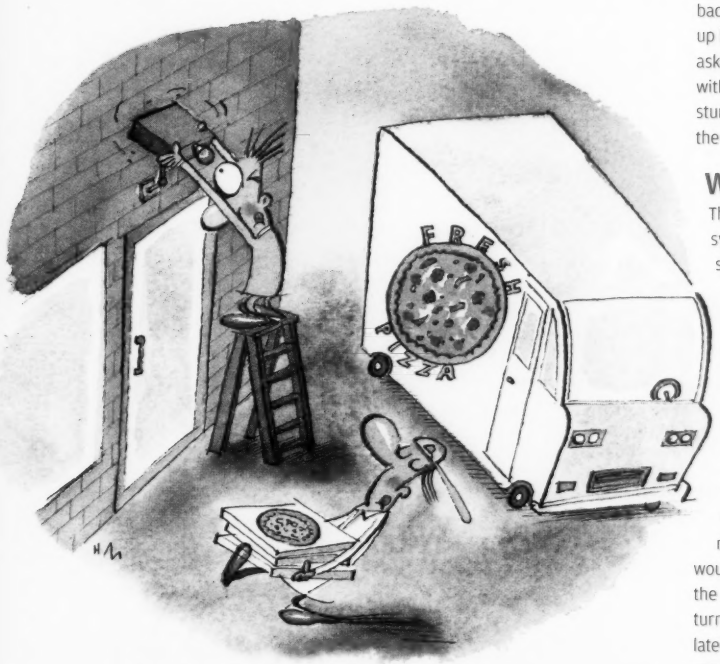

HAL MAYFORTH

We All Feel Safer Now — and Hungry

Network administrator pilot fish for a local government gets an email from a co-worker who's concerned that something is wrong with a security camera mounted on a building across the street. The email reads, "The entrance camera is showing a picture of pizza instead of the actual entrance. Just happened 15 minutes ago per staff. I have rebooted the video encoder and the camera server, and it still shows the pizza on the screen. We might need to go to the other building and see if they plugged anything into our switch."

A little while later, Fish receives a follow-up email: "Please disregard. A truck with a pizza logo was parked in front of the camera."

Oh, Right!

IT pilot fish is at a client site to do an upgrade, and the client proudly mentions that he just ordered yet another four-drawer file cabinet dedicated for backup logs. "I asked if I could see where the backup logs were kept," says fish. "I was led into a room with almost a dozen four-drawer file cabinets, holding more than 10 years' worth of backup log reports. I knew the client only has four weeks of backup media, so I pulled out a backup log report from five years ago and asked the client, 'Where is the tape with these files on it?' The client was stunned — and then quickly canceled the file cabinet order."

Who Needs It?

This IT group is evaluating IP phone systems. "A cloud-based contender sent us a switch so we could try it out using our existing IP phones," reports a pilot fish on the scene. "We gathered several bigwigs and young up-and-comers in a conference room for a demo." But one of the bigwigs keeps interrupting the vendor rep giving the demo. "Why would I want this?" he asks when she's describing management features. "This is nothing I would use." The rep calmly explains the need for the software and returns to her demo. But a few minutes later, the bigwig starts in again: "Why would we spend the money on that software if I would never use it?" Rep patiently explains that the demo will explain the need for the software. "Can we just get on with the demo and skip all of this?" bigwig bellows. Despite the interruptions, vendor rep finally completes her demo, including the full explanation of what the software does, all of its functions and the reliability the old system doesn't have. Reports fish, "When she was done, I heard the bigwig whisper to an up-and-comer, 'This is the type of capability and reliability we need in our phone system. We need to implement this immediately!' "

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OPINION

SCOT FINNIE

A Call for Mobile Innovation

It's easy to think of smartphones and tablets as the fraternal twins of mobile computing. They aren't.

I FIRST HEARD THE PHRASE "the year of mobile" in 1999. If you had told me then that companies like Microsoft, Motorola and Nokia would be lesser lights on the mobile stage by 2012 (the actual year of mobile, by the way), I would have laughed. That's why I love this industry: It changes while you watch, with new developments snicking into place like the next frame of a slide deck.

In this slide: The term *PC industry* has been rendered obsolete by the dramatically slowing growth of PC sales and the rapid adoption of mobile technologies. Gartner reports that at the end of 2012, the worldwide installed base of notebook, desktop and tablet PCs was over 1.75 billion. In October of last year, Strategy Analytics tagged the number of smartphones currently in use at over 1 billion globally, and it projects that the installed base of tablets will surpass 780 million in 2016. But wait, shouldn't tablet numbers and smartphone numbers be rolled up? I don't think so.

The tablet phenomenon is separate from, and less mobile-specific than, the smartphone phenomenon. It's easy to think of smartphones and tablets as the fraternal twins of mobile computing. They aren't. The tablet is less the newest mobile device than it is a thinner, lighter incarnation of the PC. The tablet will heavily influence both smartphones and PCs, but it is transitional. Smartphones are much better adapted to mobile. The smartphone is a game-changer that has had a profound effect on lifestyles and workstyles.

The cliché about tablets is that they're media-consumption devices, not content-creation devices. But that argument ignores the facts. Why? Because despite what the pundits opine, it's human nature to create content, and all forms of computing require input of at least short strings of text. It's easier to do that on the go with a smaller, hand-size smartphone than it is with a larger tablet. Touchscreen user interfaces spur you to hold the device with one hand and tap, scroll and swipe the screen with the other. But to use a tablet's virtual keyboard efficiently — with two hands — you need to prop a 9- or 10-inch device on a table or your lap. And it's awkward to use a two-thumb typing approach on larger tablets. The transition from touch manipulation of the screen to entering text is fairly natural with a smartphone. With a tablet, it can be tiresome.

The tablet is a very immature device, with a user interface designed for a much smaller form factor. That may be why tablets are shrinking to 7 inches and smartphones are expanding to 5 inches. Somewhere in that middle ground there may be a happy medium. We just don't know. A lot more innovation is desperately needed for mobile hardware design and platforms. Are Apple, Google, Samsung and Microsoft up to the task?

Some people question, for example, whether Apple has lost its innovation mojo. I think we're going to find out, but I wouldn't bet against Cupertino just yet. Some think Google is losing interest in Android. Samsung is merely adding the latest available technologies with every product release; that's not innovation. As for Microsoft, its Surface Pro is a surprisingly thoughtful hardware design, but Windows 8 was hustled out the door, and it shows.

Just at the moment when mobile innovation is most needed, the market leaders may have taken their eyes off the road. Perhaps that slide deck is about to advance another frame. ◆

Scot Finnie is *Computerworld*'s editor in chief. You can contact him at sfinnie@computerworld.com and follow him on Twitter (@ScotFinnie).

Discussion Underway

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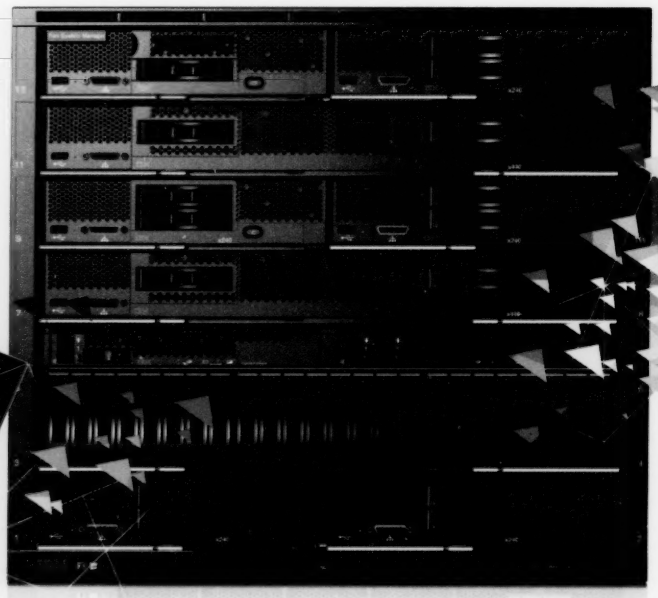

[1] Based on IBM testing and documented in IBM System x® Virtualization Server Consolidation sizing methodology. IBM Flex System x240 supports 2.7X more Peak Utilization Virtual Machines (VMs) than previous generation BladeCenter® HS22V.

[2] Based on IDC white paper "The Economics of Virtualization: Moving Toward an Application-Based Cost Model," Michelle Bailey, November 2009, http://www.vmware.com/files/pdf/Virtualization-application-based-cost-model-WP-EN.pdf

Optional IBM Flex System storage node available fourth quarter 2012.

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